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Research paper

A suggestion on analysis and utilization method of motherboard supporting led system

Seil Park[1], Jongwook Jang[2]*

[1,]Department of Computer Engineering, Dong-Eui University
[2]Department of Computer Engineering, Dong-Eui University
**Corresponding author E-mail:jwjang@deu.ac.kr*

Abstract

The most popular technology trend for desktop PC motherboard makers in recent years is the mounting of LED systems on motherboards. Motherboard LED system refers to the integrated control of LEDs of various desktop custom parts such as CPU cooler, RAM, graphic card, system cooler connected to the motherboard. In the case of the initial motherboard LED system, the integrated control of the LED was simply performed to show a cosmetically cool effect. However, the use of various color LEDs as a means of data representation has attracted attention recently. For example, data generated by a motherboard sensor is represented in a motherboard LED system. In other words, it uses LEDs supported by the motherboard to represent the temperature, LAN speed, and CPU usage of the desktop. In this paper, To propose a method to express data such as e-mail, SNS, and stock information through various API interworking to utilize motherboard LED system effectively. The proposed method enables the use of a motherboard LED system to receive notifications of Windows applications on the desktop, such as the push notification technology of smartphones. In particular, the API can be used to provide the necessary data in real time, and it is convenient and stable to process only the notification data. As a result, we can solve the inefficiency of the tuning parts that show only the aesthetic effect through the utilization method of the motherboard LED system proposed in this paper, and it can be very useful in the actual computing environment of the user. And because it can represent any data based on API even if it is not e-mail, SNS, or stock information, the value of motherboard LED system is expected to be unlimited.

Keywords: *Motherboard, LED System, RGB, Custom Parts, API, Notification.*

1. Introduction

The biggest feature of assembled desktop PC is that they consist of various components such as CPU, Motherboard, RAM, SSD, Graphics card, Case, and Power. In addition, each assembly desktop part is commercialized with various performance and design.

Assembled desktop parts are divided into two major categories. The first is to use parts for very basic performance. The second is using parts for performance and esthetic effects. Both of these are usually referred to as genuine parts and tuning parts.

Assembled desktop PC using genuine parts are mostly found in older products, and they are for performance only and have invisible inside the desktop.

Assembled with tuning parts Desktop PC are mostly found in newer products, and are for performance and esthetic effects. Especially, it has a feature that the exterior is transparent so that the inside of the assembled desktop PC can be seen for aesthetic effect.

So, of course, users who use the assembly desktop may think that tuning parts are better and better than genuine parts, but they are not. The reason is that usually tuning parts are equipped with RGB-LEDs to convey the aesthetic effect to the user. Some people do not want the visual effects of RGB-LEDs, and others do not want high power consumption through RGB-LEDs. Even in the assembled computer parts market, tuning parts have a share of more than 90%. So most people usually think tuning parts are expensive and difficult to maintain.

Therefore, if a special function is added to the RGB-LED of a tuning part rather than simply using it for an aesthetic effect, there will be less negative feedback that the tuning part thinks is a waste.

2. Rgb-led notification function

In this paper, we focused on RGB-LED notification function of smartphone which usually uses RGB-LED to utilize RGB-LED.[1-2].

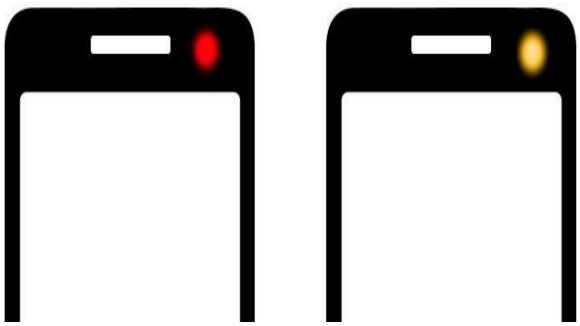

Fig.1: Rgb-led notification function of smartphon

Figure.1 shows the notification function using the RGB-LED of the smartphone, and it can inform the user of the notification of the application or the status of the smartphone according to the color of the LED. For example, the red LED on the left shows the

low battery status of the smartphone, and the yellow LED on the right shows kakaotalk's message reception notification during the smartphone application.
RGB-LEDs can be expressed in various colors up to 255 ^ 3. Therefore, a wide variety of notifications on the smartphone can be expressed through RGB-LEDs. So an assembled desktop PC that uses RGB-LEDs will be able to express the application's notice using RGB-LED like smartphone.

2.1. Motherboard features and precautions for rgb-led control

In order to utilize the notification function utilizing the RGB-LED, it is necessary to control the RGB-LED.
Here's how to control the RGB-LED on an assembled desktop PC

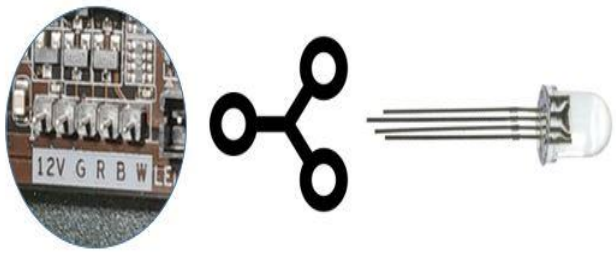

Fig.2: Rgb-led header on motherboard

Figure.2 is an RGB-LED HEADER that exists to control the RGB-LED on the motherboard. Depending on the manufacturer of the motherboard, it usually consists of R (red), G (green), B (blue) signals and a 12V power supply.
However, not all motherboards support RGB-LED HEADER as shown above. Controlling RGB-LEDs is a feature that only supports the latest high-end product line, and must be checked before control. If it is an affordable entry or is older than the Intel SkyLake family, it is very likely that it will not support the RGB-LED Header. This is because most tuning LEDs are controlled by a separate controller rather than a motherboard due to price issues.

2.2. Collaboration between desktop pc application and rgb-led header



Fig.3: Rgb-led headers and applications

Figure.3 shows the possibility of collaboration between various applications based on motherboard's headers and windows operating system to utilize RGB-LED.
Providing notification of applications such as e-mail, SNS, and stocks based on Windows operating system is very different from the notification provided by simple operating system.
Because e-mail, social networking, and stock applications are connected to the Web and provide notification to users based on various data supported by the web. Therefore, in this research, to provide application notification function with RGB-LED Header, it requires notification data of the application.[3-5].
If the user can be notified based on the data of the application, the assembled desktop PC will be able to provide the notification function through the RGB-LED like the smartphone.

3. Notification data and data processing method

In order to inform the user of the application with RGB-LED, notification data is needed. There are many ways to use application notification data.
The first method is to receive notification data from the application. However, it is very difficult to provide notification data in applications. The second method is to parse the required data on the web. The most common method is to use any data that can be found on the web. Web parsing, however, has the drawbacks of having to constantly modify when changing the web structure and the lack of reliability. The third method is to use the API data provided by the application service provider. API data is characterized in that the user can process and utilize the data. In particular, APIs are more sophisticated than Web parsing because Web parsing is a difficult problem to solve if the required data requires login, but the API can be solved.
Therefore, it is best to use the easiest and most useful API to receive notification data.

3.1. Utilizing api data

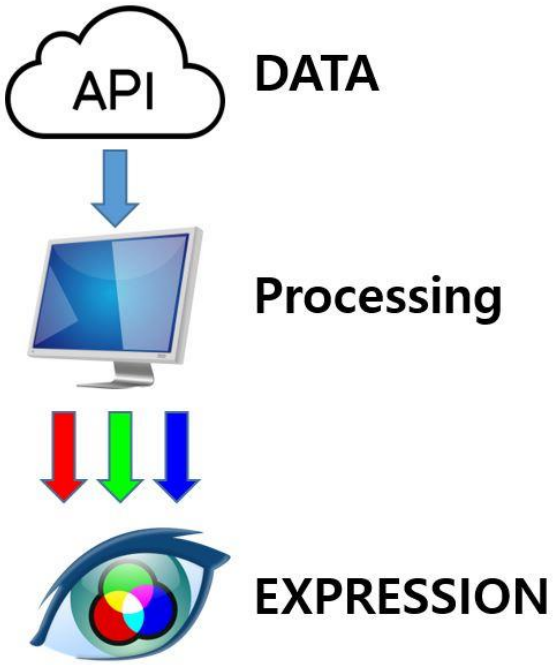

Fig.4: Basic configuration of system using api

Figure.4 shows the processing of the API as a basic system configuration using the API and rendering it as RGB. Processing is required to utilize the API DATA received from the service provider. This is because you need to select only the really necessary parts of the received API data. Therefore, the processing step is required because only necessary data among received API data must be parsed.[6].
For example, assume that the price information of cryptocurrency is represented by the RGB-LED of the desktop PC motherboard.
In order to receive price information of cryptocurrency in real time, api is provided from the cryptocurrency application service provider. The following figure shows that even if you only need price information among the information data of numerous cryptocurrency provided by the service provider, there are many kinds.



Fig.5: API containing price information of cryptocurrency

Figure. 5 shows the API DATA structure that provides only the price information of cryptocurrency. As shown in the picture above, the cryptocurrency price information API DATA has a lot of information such as the lower limit of the cryptocurrency yesterday, the upper limit price, the transaction amount and so on. However, in order to express price information of cryptocurrency in real time, it only needs price information of real-time crypto currency. Therefore, it is impossible to control the RGB-LED immediately after receiving the API data, and processing and parsing are required as necessary data.[7-8].

3.2. Expression method

As mentioned in subheading 2.1 above, RGB-LEDs used in assembled desktop PCs are composed of the most common 4 pins. One power supply pin and three color signals can control the RGB-LED. In this study, customizing is the main reason to express application notification as RGB-LED.

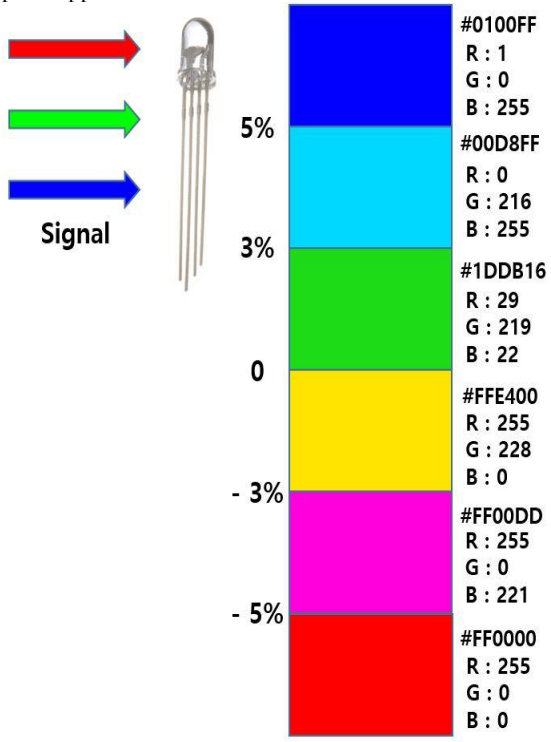

Fig.6: Example of RGB-LED control and DATA representation

Figure.6 shows an example of RGB-LED control and Cryptocurrency price information. It can be seen that combining digital signals of three colors of red, green, and blue can be expressed in various colors. Therefore, application notification data can be customized to LED of desired color.

For example, when the price information of cryptocurrency is represented by RGB-LED as shown in Fig.6, it can be seen that the change of color can be represented by digital signal according to the price change of cryptocurrency.

4. Expression result

Express the application's notification data through the API to the assembly desktop PC. As described in introduction, various components such as CPU, motherboard, RAM, graphic card, and cooler that make up the assembled desktop PC must support RGB-LED. The case must also be made of a transparent material with an inside view.

The reason for this is that the focus of this study is solving the waste of the tuning parts by using the motherboard. Also, the more components that make up the desktop, the more RGB-LEDs they support, the better they will be able to express data notifications in their applications.

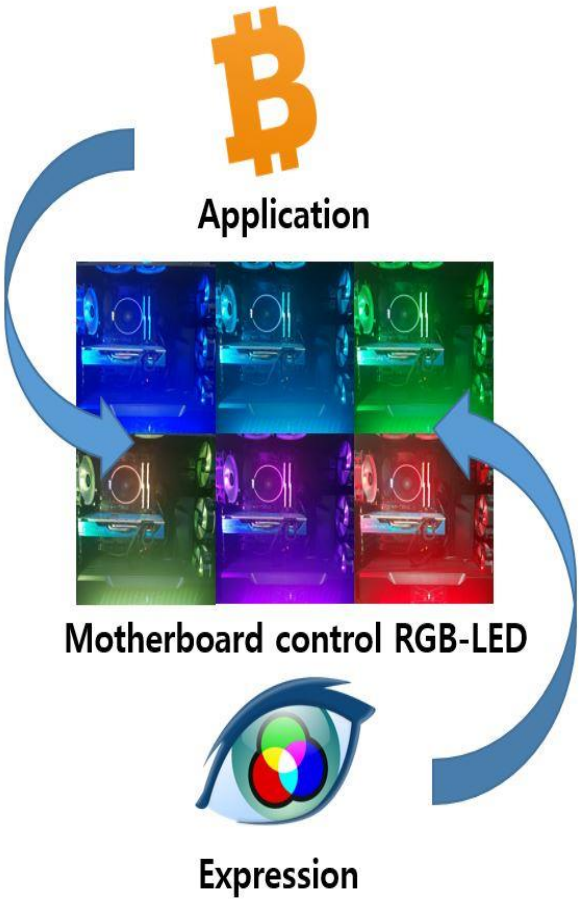

Fig.7: Application notification expression using motherboard control

Figure.7 shows the representation of DATA using RGB digital signal shown in Fig.6 to express the notification of cryptocurrency application using RGB-LED control of motherboard. This allows the user to recognize the notifications that the cryptocurrency application wants to convey via the color of the LEDs.

In this example, the cryptocurrency application of various applications such as e-mail, SNS, and stock based on the Windows operating system is shown through a picture by blending with the motherboard of the assembly desktop PC.

4.1. Effective expression

In addition, we showed that it is possible to express various application notices by controlling RGB-LED using motherboard. Theoretically, RGB digital signals can represent a maximum of 256 ^ 3, as described in subheading 2 above. However, RGB-LEDs can represent 256 ^ 3 colors in hardware, but the human body has a problem that it is difficult to accurately distinguish all the colors represented by RGB-LEDs instantaneously. Therefore, since the LED notification function of existing smartphone also expresses only 7 ~ 12 colors, it is most effective to express the

proposed system in only 12 colors which are easy to distinguish from human.
Based on the RGB signals of the motherboard, the red, green, and blue digital values show contrast values. As a result, it is easy to distinguish the colors, which can be seen from the RGB signal codes of the colors shown in Figure 6.

5. Conclusion

In this paper, we try to solve the problem that the parts installed on the assembled desktop PC are wasted because most people only show esthetic effects. We designed a system that can solve the above problems by using the RGB-LED headers of the motherboard of computer parts. In order to transfer control data to motherboard RGB-LED Header, API was provided from service provider of application based on Windows operating system such as e-mail, SNS, and stock information.
In this study, API was provided to get pricing information of cryptocurrency application, and API was analyzed and only necessary real-time cryptocurrency price information was parsed.
Using the pin array and standard control characteristics of the standardized RGB-LED, we have shown that various colors can be expressed by combining the three digital signals of Red, Green, and Blue.
In addition, we proposed a method to represent the price change of Cryptocurrency through the characteristics of RGB-LED mounted on assembled desktop PC as a way of expression.
In conclusion, we can maximize the utilization of tuning parts with more than 90% share in assembled computer market by using LED system of motherboard. And this system can implement the notification of all applications because it can provide hardware support in the same condition as the notification function of the smartphone. Therefore, it is expected that the motherboard supporing LED system proposed in this study can be applied not only to the assembled desktop PC but also to the notification system in various fields using RGB-LED.

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