November-December 2019
ISSN: 0193-4120 Page No. 2345 - 2351

Design of One-Board Type of Multiple Video Control Module

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Abstract
In this study, we propose a one - board type multi - video control system that can be driven by a device. It transmits subtitles through a mobile application and can arbitrarily control the screen size. This control system has one-board multi-function multi-video control function of smartphone app, so it is easy to use LED media board as multi-purpose device. In this paper, the main research is to provide one board type implementation and O2O service to secure safety and minimize errors of multi-display equipment. In this paper, we propose the one - board multi - controller technology development process and present one - board hardware diagram. The technical aspect of one-board multi-controller system is that the device and related software for a specific purpose is more essential product technology as the Internet of things is activated. It is not a closed product with proprietary patent rights and completes the future service platform by using open technologies. Various types of advertisements can be accessed.

***Keywords**: LED, O2O, Multi Type Video, Multi Control, One Board.*

1. INTRODUCTION

Countries around the world are investing in green industries based on green IT technology to prevent global warming and create new growth engines. This creates employment and stimulates the economy, while at the same time responding to climate change and low carbon emission era [1]. In particular, LEDs and inorganic EL, organic EL sheets, screens, large LED TVs, and various displays are pouring out numerous advertisements for indoor and outdoor multi-displays [2]. In addition, due to high oil prices / high prices, the economy faces a great crisis, and special high-strength measures are needed [3]. Due to high oil prices, the general economy is experiencing difficulties in general. Support for low-income and low-income brackets is rapidly rising due to high oil prices. This is due to the fact that low-income households with a high proportion of consumption of essential goods spend a great

self-employed workers who work with their vehicles is rapidly rising, leading to a deterioration in profit structure. As a result, it is expected that future developed products will be more environmentally friendly and economically efficient, and that the technology transfer products will be suitable for this product and are expected to be highly environmentally friendly and highly efficient. In this paper, the goal is to provide one board type implementation and O2O service to secure safety of multi display equipment and minimize errors. In this paper, we propose the one - board multi - controller technology development process and present one - board hardware diagram. This system is

November-December 2019
ISSN: 0193-4120 Page No. 2345 - 2351

expected to be effective in terms of energy saving and multimedia use because it has the advantage of displaying images effectively without using the full screen as necessary. This paper describes the related research on the LED related lighting situation in Chapter 2, and the one-board multi video control system proposed in the paper in Chapter 3. Section 4 describes the development of O2O service software. Finally, Section 5 concludes the paper.

2. Related Works

Display is a national infrastructure that we all have, and recently the lighting system has been turned into a low power device. It is at the time of conversion to LED lighting infrastructure according to LED 1530 supply project. Because LED lighting is used in various places, it can be expanded to various application areas. In addition, due to the spread of LED, much attention has been paid to products with more efficiency than LED, and it is widely used in various lights such as automobile rear lights, headlights, lighthouses, ship lighting, traffic lights, street lights, and interior lights. And it is widely used for next generation multimedia. LED lighting can provide various services as well as lighting, because it can promote and transmit information. In the domestic market, SMEs form the market, and market share is as shown in Figure 1.

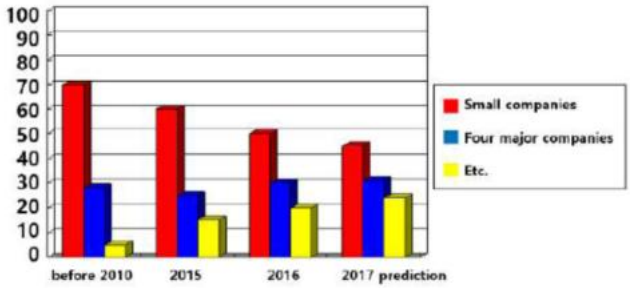

Figure 1: Graphical Domestic Display Market Survey [Korea Institute of Science and Technology Information

According to domestic advertising market data of Korea Advertising Association and Cheil Worldwide, domestic market size of domestic outdoor advertising market is estimated to be 875 billion won before 2010, 2 trillion won in 2014, and 3.5 trillion won in 2017. Currently, LED billboard advertisements account for about 4% of total outdoor advertising market, and annual growth rate is expected to be around 3% per year [5]. However, the market for large outdoor full-color LED display panels is expected to maintain a growth rate of 1% per annum over the next five years due to the government's restriction on the new signboards. According to Japan's Yano Research Institute [6], large - sized displays and LED indicators are usually installed on the outer walls of stadiums and commercial buildings, but the number of indoor installations is also increasing. In 2008, the world market increased by 104% to 780 million units in 2007. It is expected that the market will expand to 1.2 billion by 2015 due to an increase in system sales such as electric billboards along with the economic recovery.

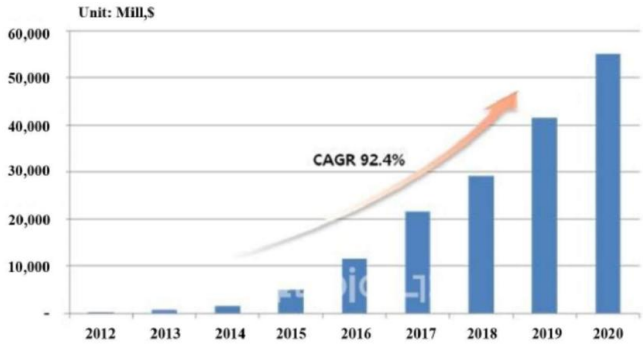

Figure 2: LED System Lighting Market Growth Forecast Graph

From the viewpoint of the energy industry, LED lighting is in the stage of full-scale development through support from all over the world, regulation of incandescent lamps, improvement of LED efficiency and drastic price reduction. In addition to LED function, it also has brightness control, color adjustment, communication function with other devices, and it is expected to mass-produce a variety of industries fused with LEDs. Based on this, it is necessary to maximize the energy savings through the combination of

November-December 2019
ISSN: 0193-4120 Page No. 2345 - 2351

LED lighting and IT technology, and furthermore, emotional lighting effect to react with human emotion, communication function utilizing various sensor functions, it is lighting. In other words, the LED system lighting industry is a technology that opens the era of new lighting that changes the paradigm of lighting. In particular, if the existing lighting is converted into the LED system illumination, it can save 50% more than simply replacing the LED lighting through intelligent integrated management, sensor interlocking and customized situation management. These LED system lights are facing the energy crisis, and the market is being formed mainly in commercial buildings. In the commercial lighting field, the energy consumption is much higher than that of the residential use because the use time is much higher even though the number of the lighting is small. Therefore, the effect and necessity of installation of LED system lighting is expected to be larger than residential use. In this respect, energy management regulations (including lighting) for commercial buildings are also being reinforced in many countries around the world. In the case of Korea, the government has decided to gradually strengthen the energy saving rate of apartment housing to meet the level of developed countries in order to enhance energy efficiency of buildings. As a result, the market for LED system lighting will be formed mainly in commercial buildings, and it is expected to spread to industrial, outdoor, and residential areas. According to SNE Research, "The LED system lighting industry is expected to grow rapidly from 2015, starting from this year." The amount is expected to grow at an average annual rate of 92.4% from $ 93 million last year to $ 55,075 million in 2020, the forecast would be high growth."

Table 1: Overseas market growth rate

Division	2003	2008	2018
LED market	$ 9.3 billion	$ 13.9 billion	$ 50 billion
LED application market	$ 6.1 billion	$ 10.2 billion	$ 30 billion

3. ONE-BOARD TYPE OF MULTIPLE VIDEO CONTROL MODULE

As shown in Figure 3, the proposed system controls the LED media board using the mobile device as in the existing system. However, while the existing control system uses SMS of the mobile communication company, the system proposed in the present invention remotely controls the wireless Internet service of the mobile communication terminal. In general, the wireless Internet is a way to view pages such as Wireless Application Protocol (WAP) or Microsoft Mobile Explorer (MME) using a mobile browser. This method is only used for text and simple image representation. It includes environment such as J2ME, GVM, BREW supporting multimedia service, and supports graphic, sound, socket communication and enables multimedia contents development. Due to the large number of devices in the existing system, high purchase cost is incurred, and frequent AS and high cost maintenance costs are incurred. As a one-board type control system proposed in this paper, it can be seen that it is very simple compared with the existing system, and it is expected that the purchase cost of the consumer can be greatly reduced.

November-December 2019
ISSN: 0193-4120 Page No. 2345 - 2351

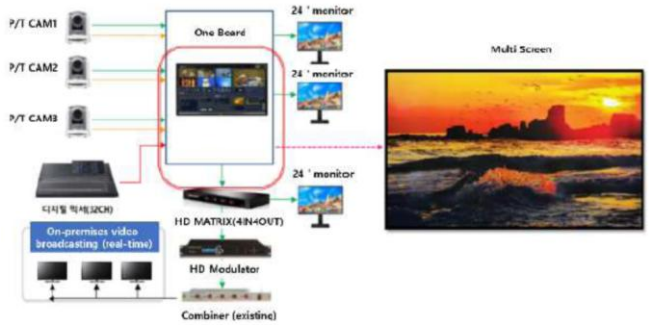

Figure 3: One Board Type Multi Video Control System

3.1 Interface design of media board screen control

The detailed design of the interface parts for the screen control inside the system proposed in this study. The controlled system's control interface drives the LED media board by receiving data from a PC or DVD player to control the LED media board. The detailed configuration of the interface part is shown in Figure 4, and the right part belongs to the MUX. The system implements a GVM-only application for smartphones and the media board controller applies an embedded system. In addition, for mobile-based remote control, an embedded Internet server function should be embedded. You can independently control and monitor the media board system using the embedded system used to control the media board. It also uses sockets communication to connect to the Internet instead of SMS, so real-time control is possible and reliability is improved. Because SMS usage is constant, mobile-based wireless Internet services have little risk of congestion. Therefore, the stability of the entire system can be secured. The controlled system's control interface drives the LED media board by receiving data from a PC or DVD player to control the LED media board.

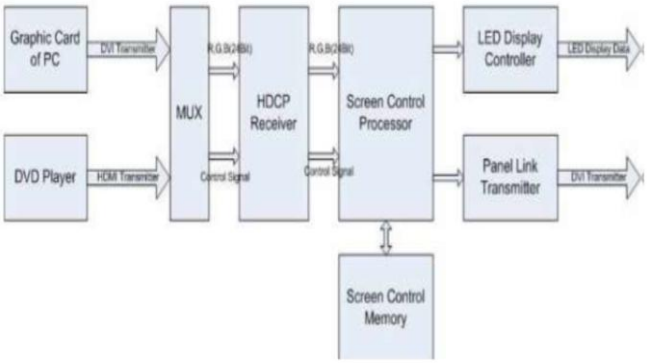

Figure 4: Interface logic circuit for screen control

The detailed configuration of the interface part is shown in Figure 4, and the right part belongs to the MUX. Both the DVI transmitter on the PC and the HDMI transmitter on the DVD player can be exchanged using Transition Minimized Differential Signaling (TMDS) transmission. You can also use the DVI terminal on one side and the HDMI terminal type cable on the other side. The screen control processor sends the video signal received via the dual-link HDCP receiver Sil1169 to the LED media board controller. And generates various control signals and digital image data for transmission to the variable image screen control interface device to control the next media board through the panel link transmitter. The Screen Control Memory is a storage device that can temporarily store 24-bit video data output from the DVI transmitter and DVD player's HDMI transmitter port, as shown in Figure 4. This video memory is used to store even-numbered frame data or odd- And transmits video data.

3.2 Designing One-Board Multi controller Hardware Diagram

The original board hardware control proposed in this paper was developed considering extensibility as <Fig5>. It has to be interlocked with the input / output board for actual electric signboard control, and has an interface structure in which other equipment can be interlocked. (eg, USB, serial, etc.) In addition, the screen LCD should work smoothly, and enough system

November-December 2019
ISSN: 0193-4120 Page No. 2345 - 2351

resources must be available to run the Android OS.

In this paper, hardware specification of one board hardware control is video input: DVIx1, HDMIx1, VGAx1, CVBSx2, USB / SDI (optional), Video output: DVIx1, LED Outx2, Audio input: HDMIx1, DVIx1, x1, Audio output: 3.5mm audio interface x1, PC control interface: USBx1, USB upgrade: USBx1, LCD screen: 2.4inches full color LCDx1, Key: x18, Knob: x1.

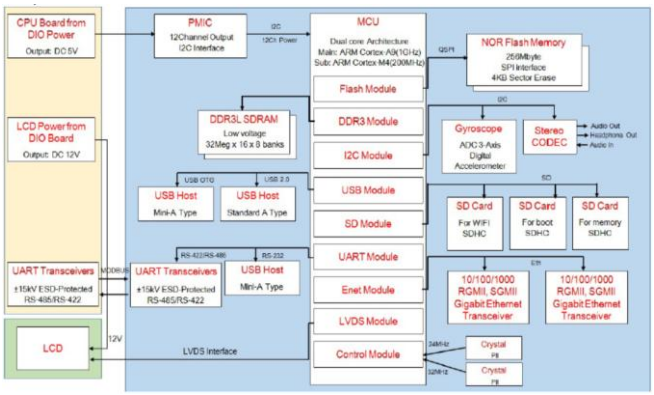

Figure 5: One-board multi-controller hardware diagram

The advantage of this one board hardware controller is that it can be used for large LED display screen, mixed LED display, large stage theater, exhibitions and exhibitions with 6 channels of video input, 2 channels of video output and 1 channel of audio output. In addition, the input terminal can support multiple input interfaces of HDMI, DVI, VGA, 2xCVBS, SDI / USB, output DVI, LED Outx2. It is also possible to support quick switching of saved scenes by storing and recalling presets, synchronization of audio and video switching for audio and video synchronous, chroma key function, and project lock setting to prevent malfunction. Android OS Porting for Android Applications on One Board We have designed a device driver and JNI (Java Native Interface) that takes into consideration the type, purpose, and extensibility of peripherals, requires performance optimization by building a development environment (Linux), OS porting and customizing.

4. O2O SERVICE SOFTWARE DEVELOPMENT

The One Board Type Multi Video Control in this paper refers to the service outline drawing and flow chart of the O2O service, and a method and an embodiment of O2O service will be described as follows: Figure 6.

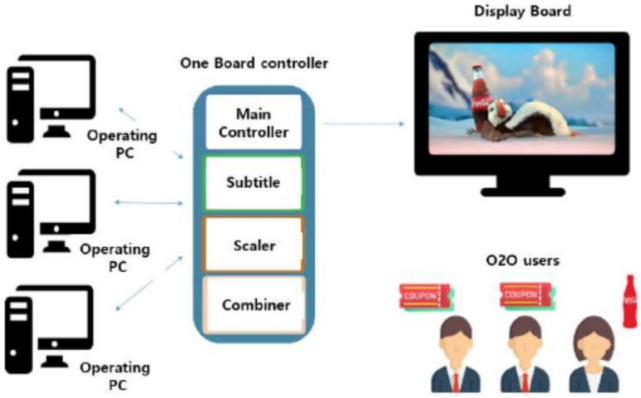

Figure 6: O2O service software scenario

First, a user watching a billboard downloads an app on the Internet and installs it on a mobile terminal. Next, login to the display window requesting login to the mobile terminal. If you do not join the membership, you will go through the membership process. If a certain signboard image is displayed after login, for example, if a Coca-Cola ad is being displayed, the user who views the application may write a specific phrase of the advertisement on the signboard, play an event game, User will be able to receive users O2O product automatically. Also, when the signboard advertisement screen of the item matching the membership information and the object of interest is displayed, the user may be able to automatically receive the product. For example, a woman who has just delivered a baby will be able to receive it automatically. Thus, the advertiser can receive the advertisement maximum effect because the advertisement is targeted to the advertisement main target, and the user can receive the service to receive the goods through the O2O service.

Figure 7: Apps that users see in real time and download previously

Figure 7 is an example of O2O service that shows when a user watches a billboard in real time and launches an app that has been downloaded previously. When the user launches the downloaded app, the same advertisement as the electric signboard comes out, the event game occurs, and the user can receive the O2O coupon instantly after winning the scissors rock game played as the event [11-13].

5. CONCLUSION

We propose an LED media mode control in this paper, we propose a one - board type multi - video control system. This control system has one-board multi-function multi-video control function of smartphone app. And it is now easier to use the LED media board as a versatile device. In addition, it enables one-board type implementation and O2O service to secure safety and minimize errors of this multi-display equipment. In this paper, the technical aspect of the One Board Type Multi Video Control System is that the device and related software for specific purposes are more essential product technology with the activation of the Internet of objects. It is not a closed product with proprietary patent rights, complete service platform. Various types of advertisements can be accessed. In terms of social aspects, the waste equipment is environmentally polluted. The proposed system is developed as a one-board type, and it is equipped with a smart and smart Android board which can operate easily with mobile phone and tablet. Finally, economic aspects can be delivered as soon as the system is completed and stabilized after sample delivery, so development security is also important. These points are likely to lower purchasing costs by 25 ~ 30% in the first half of the domestic advertising market by first integrating control systems into large multi-screens.

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