

Smart Digital Signage using Smartphone

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Abstract— Digital signage contents are usually used to be displayed in fixed location. And many people interact with one device (displayer). User (retailer) plays a role for interaction with the device and the just viewer. So we propose the system that user plays an important role as delivering the signage contents through smartphone application. User can download and install the advertising smartphone application. During viewing the signage content through the application, it downloads the signage contents and delivers them to other users (smartphone that application was installed).

Keywords— Digital signage, smartphone application

I. INTRODUCTION

Digital signage services are generally used to display something in public or private place. Something will be contents including text, images, animations, video, audio, and interactivity to inform someone about information for product. And these are mainly displayed in out-of-home and big screen. That is to say, the common goal of digital signage is to deliver the targeted message to specific persons in specific location using specific device at specific times as scheduled.[1][2]

The environment for digital signage, however, has been gradually changed.

One of many changes in advertisement is bi-directional service. The traditional advertisement system displayed the advertisement in one way to consumers. But the recent one is interactive with consumers through touch-screen, mobile phone, camera and etc.[2][3][4]

The interaction is the other big current of digital signage. It makes a digital signage far more useful. It can be included in user interaction techniques that buttons, touch-screens, multi-touch, gesture using camera and mobile phones.[5][6][7][8]

Use of the touch-screen has experienced resurgence in popularity in the past five years as a result of the success of mobile devices that use this interactive interface, namely, the iPhone and Android smart-phones, as well as the increasingly popular tablet computers and e-book readers. An interesting consequence of this popularity is that people who see non-interactive digital signage are touching the screens and expecting a reaction. Even for digital signage that has a traditional touch capability; users are likely to try using multi-touch gestures to zoom in and out on the display.[9][10][11]

Multi-touch has become so popular for mobile phones that it's probably only a matter of time before it becomes the industry standard for all touch-based interaction. However, when employed for large signage, multi-touch is a costly

proposition because the capacitive touch-screen solution does not scale well, and light beam solutions require precise engineering. The industry is working hard to invent cost-effective multi-touch solutions for use on large LCD display panels.[11][12]

Another interaction technique for digital signage is the use of a smartphone to control the content. Using Bluetooth or other short-range wireless technologies, the smartphone can become a remote control for the display, presenting the control interface on its screen. Because short-range wireless minimizes delays between user and sign, it can be an effective method of low-latency interaction. Furthermore, as a user navigates information on the large display, the control menu on the phone can be adapted to match the content being shown.

But the signage contents required the higher capacity according to the needs of the higher resolution contents. And this facts result in the enlargement of digital signage server.

In this paper, we propose the new digital signage system using smart-phones. Here, smart-phones is not used to just viewing tool of signage contents but used to delivery tools of signage contents.

The paper is structured as follows: Section 2 briefly describes the proposed overall system. Section 3 defines our functional architecture for the new signage system. Section 4 discusses the feasibility of the proposed system. Section 5 concludes the paper with a summary of key points.

II. OVERALL SYSTEM



Figure 1. A concept of the new digital signage system.

Fig.1. above shows the overall conceptual structure of the proposed digital signage system.

When user who exploits smart-phone is interested in advertisement being displayed she/he downloads the smart phone application for viewing the ad through own smart-phone. As application being installed to smart-phone, user can directly download the signage contents from signage server or other smart-phones that application was installed. That is to say, smart-phones that application was installed are utilized for means to deliver the signage contents to other users that installed the application.

①indicates the main display of the digital signage and plays an role in displaying the signage contents received from the digital signage production server.

②shows the digital signage application(DS App). It takes charge of the showing of the downloaded signage contents and their delivery.

③plays a role in linking with the site where the DS App is located. It can be a simple one or two-dimensional barcode.

④indicates the smart-phone that DS App will be installed.

⑤~⑧indicate the smart-phones that DS App is already installed. They can receive and deliver signage contents from to each other.

Where, user's smart-phone is used for the delivery means of the signage content also. So, in order to maximize the interest of users we think that the proposed system must have the proper compensation system (e.g. coupon, reserving, point and etc).

III. THE FUNCTIONAL ARCHITECTURE

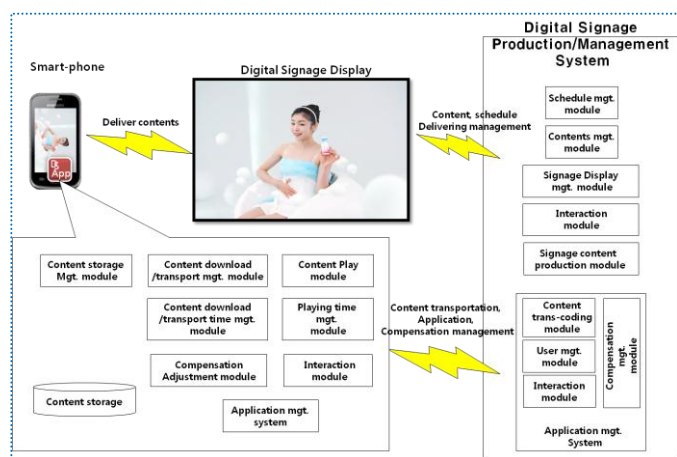


Figure 2. The functional architecture of the proposed signage system

Fig.2. shows the functional architecture of the proposed signage system. It consists of three parts largely, digital signage production/management system, digital signage display and smart-phone (application). The signage contents' list is shared with all users installing the application to smart-phone.

The module elements composing our system are also shown in Fig.2. They are explained in the following.

A. Digital Signage Production/Management System

In digital signage production/management system, *signage content production, interaction, signage display mgt., contents mgt., schedule mgt. modules* are responsible for traditional functions of digital signage production system.

Signage content production module makes new signage contents. To encode and package contents is also one of roles of this module.

Interaction module controls the signage displayer according to the user interaction.

Signage display management module transports signage contents to signage display server according to the schedule and checks the statue of the signage display server.

Contents management module plays a role in managing contents not only for signage displayers but also smart-phones.

Schedule management module is responsible for designing the display schedule of contents

B. Digital Signage Display System

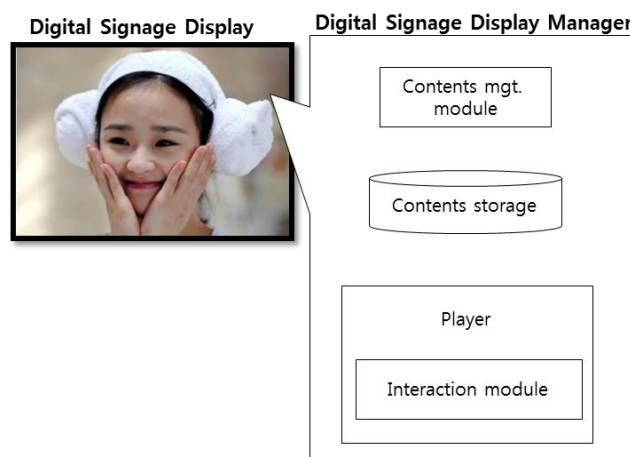


Figure 3. Digital signage display system

In Fig.3. *digital signage display system* is shown. It is consisted of two parts largely. One is the displayer of signage content and the other is the manager controlling contents' play. According to the input interface of the displayer, manager sends the content rendering data to the displayer.

Digital signage display manager is responsible for managing signage contents and controlling the player. It can adjust the synchronization of the decoding result of the content.

Player takes charge of playing contents including the user interaction.

Except digital signage display manager, display system is similar to the usual one.

compensation system that could attract the interest of many people.

We expect that the compensation system and delivery system of signage contents using smart-phones can promote the purchase of commodity.

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REFERENCES

- [1] ABI Research, "Digital Signage Revenue to Approach \$4.5 Billion in 2016," May 31th, 2011. [http://www.abiresearch.com/press/3687-Digital+Signage+Revenue+to+Approach+\\$4.5+Billion+in+2016](http://www.abiresearch.com/press/3687-Digital+Signage+Revenue+to+Approach+$4.5+Billion+in+2016)
- [2] ITU-T H.780(ex H.FDSS), Digital signage: Service requirements and IPTV-based architecture, Draft new Recommendation, June 2012.
- [3] Intellian systems(2011), "Digital Signage Content distribution system optimization technology", *Digital signage news*, vol.05.2011. SEP.
- [4] Steve G urley. "Trends in mobility and the implications on digital signage", *DigitalSignageToday White paper*. 2011
- [5] C. Yoon, H. Lee, S. Hyun Jeon, and Hyunwoo Lee, "Mobile digital signage system based on service delivery platform location based targeted advertisement service," *International Conference on ICT Convergence (ICTC)*, 28-30 Sept. 2011, pp. 582 - 586.
- [6] J. Muller, J. Exeler, M. Buzeck and A. Kruger, "Reflective Signs: Digital Signs That Adapt to Audience Attention," in *7th International Conference Pervasive Computing (Pervasive 2009)*, Nara, 2009, pp. 17-24.
- [7] I. Satoh, "An Agent-Based Framework for Context-Aware Digital Signage," in *1st International Symposium on Ambient Intelligence (ISAmI 2010)*, Guimaraes, Portugal, 2010, pp. 105-112.
- [8] J. Muller and A. Kruger, "MobiDiC: Context Adaptive Digital Signage with Coupons," in *3rd European Conference on Ambient Intelligence (AmI 09)*, Salzburg, 2009, pp. 24-33.
- [9] H. Sato, M. Urata, K. Yoguchi, N. Arakawa, N. Kanamaru and N. Uchida, "Linking Digital Signage with Mobile Phones; Advertising services that temporarily link and synchronize mobile phones and digital signage", *Intelligence in Next Generation Networks, 15th International Conference on ICIN 2011*, 4-7 Oct., 2011, pp. 86-91.
- [10] I. Satoh, "Mobile Agents for Digital Signage", *8th IFIP WG 10.2 International Workshop, SEUS 2010*, Waidhofen/Ybbs, Austria, 13-15 Oct., 2010, pp. 216-226.
- [11] Roy Want, Bill N. Schilit, "Interactive Digital Signage," *Computer*, vol. 45, no. 5, pp. 21-24, May 2012, doi:10.1109/MC.2012.169.
- [12] C. Bauer, P. Dohmen, C. Strauss, "Interactive Digital Signage-An Innovative Service and Its Future Strategies", in *Proceeding EIDWT '11 Proceedings of the 2011 International Conference on Emerging Intelligent Data and Web Technologies*, 2011, pp. 137-142.