

The Application of Digital Signage System using Smart Device

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Abstract— Digital signage is a form of electronic display that shows information, advertising, messages, and TV programs in both public and private environments, including retail stores, hotels, and stations. We introduce another application of digital signage using smart devices. Unlike an existing digital signage displayed at a fixed location, the proposed digital signage system can be seen in anytime and anywhere using smart-devices if you can use a network service. And because the proposed system gives and takes the information(advertisement data) among smart-devices, the application user can be compensated according to the amount of data transferred to other smart-devices or the usage time of the application.

Keywords— Digital signage, Smart-devices

I. INTRODUCTION

Digital signage is a type of electronic device that shows information, advertisements, messages, TV programs, and so on. Such digital signage services are typically provided in a fixed location.

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

One of the many changes in advertisement is bi-directional service. With an appearance of smart-devices, the interaction technologies with the user are generalized. Among them touch-screen technology is most widespread.

The use of a 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 using 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 smart-devices that it is probably only a matter of time before it becomes the industry standard for all touch-based interactions. 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].

Even if the advanced technologies listed above are used, however, because the signage contents are only displayed in a fixed place, on a specific device, and at a scheduled time, a lot of inconvenience is created and the effect of the advertisement cannot be anticipated. When not particularly interested in an ad, people will only glance at the signage display. And because ads are rotated cyclically, people must wait for quite a long time to see the ads they are interested in. In addition, because a lot of people interact with a single device, it is also not good in terms of personal hygiene.

In this paper, we propose an application of digital signage using smart-devices. Users can download and view the signage content through a smart-device application. Additionally, users can interact with the signage content and send it to other users who have installed the same smart-device application. That is, smart-devices are used for the downloading, viewing, interaction, and transmitting tool of the signage content. By applying these features on smart-devices, we try to increase the advertising effectiveness.

The remainder of this paper is structured as follows. Section II briefly describes the overall proposed system. Section III defines the function of the application of smart-device. Finally, section IV concludes the proposed digital signage application.

II. OVERALL SYSTEM

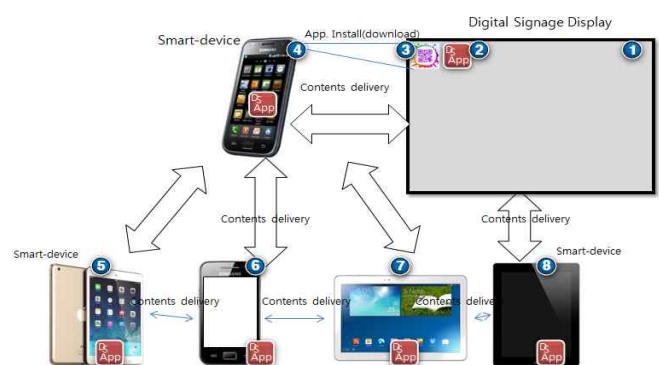


Figure 1. The overall digital signage application

Fig.1 shows the overall conceptual structure of the proposed digital signage system linked with smart-device application.

When smart-devices' users are interested in an advertisement, they can download a smart-device application to view the ad using the URL information displayed in the signage displayer. As the application is being installed on their device, the users can directly download the signage content from the signage server or from other smart-devices that have already installed the application and had the content. That is, smart-devices with the application installed are utilized to deliver the signage content to other users that have installed the application.

In Fig. 1, (1) indicates the main display of the digital signage and plays a role in displaying the signage content received from the digital signage production server; (2) shows the digital signage application(DS App), and takes charge of displaying the downloaded signage contents and their delivery; (3) plays a role in linking with the site where the DS App is located, and a simple one or two-dimensional barcode can be used; (4) indicates the smart-phone where the DS App will be installed; and (5) through (8) indicate smart-devices where the DS App is already installed. They can receive and deliver signage content from and to each other.

III. THE FUNCTION OF THE APPLICATION OF SMART-DEVICE

The application installed on a smart-device is responsible for downloading the contents, transmitting them, managing the downloaded contents and playing them. The content storage plays a role in managing the content, for example, saving new content or deleting content stored in interior or external memory.

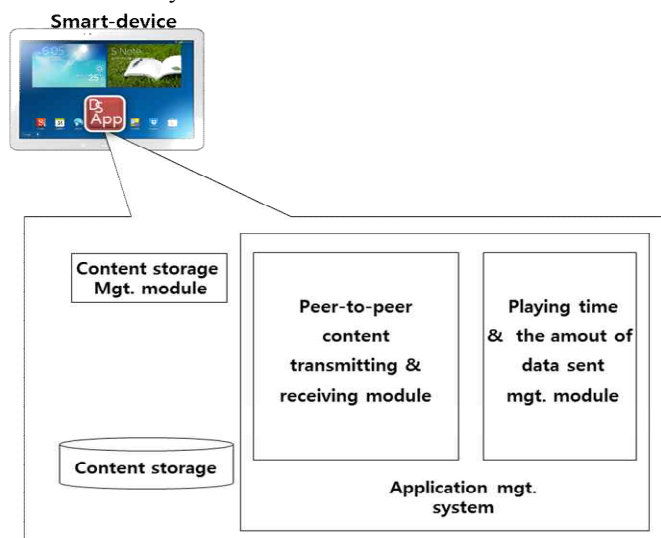


Figure 2. The function of the application

The content download or transmission is conducted using peer-to-peer technology. The peer-to-peer content transmitting and receiving module makes it possible to transmit the downloaded content to other peers, and to receive the queried

contents from other peers. Recent advances in mobile devices and wireless radio access technologies have enabled the development of mobile P2P applications for smart-devices [14]. We introduced Bit-torrent to our P2P module. Prior to distribution, the content is divided into multiple pieces, and each piece into multiple blocks.

The content playing module is responsible for playing the signage content and receiving user interaction. It also includes a content decoder and an interaction function.

Generally, due to the file transfer speed of smart-devices is the same as in table 1, it is possible to P2P transfer the contents using the smart-devices.

Table 1. The speed of mobile Internet access methods

Common name	Primary use	Downstream (Mbit/s)	Upstream (Mbit/s)
LTE	General 4G	100~300	50~75
Wi-Fi	Mobile internet	288.8~600	288.8~600
WCDMA	General 3G	0.384~14.4	0.384~5.76

For the simulation, we encoded several HD quality contents to 3Mbps, where each content occupied the volume of data among 23M~34Mbytes according to the playing time (60~90seconds) having frame rate of 30fps.

Measuring the time spent to transfer contents above using three smart-devices and Wi-Fi network, it took about 0.3~0.5 seconds.

Since a digital signage system typically supports the download & play type, the content can be also downloaded during an idle time in the background using 3G or LTE network

IV. CONCLUSIONS

We have developed a new application of digital signage using smart-devices. The developed system can deliver advertisements via the smart-devices, which makes it possible to increase the effectiveness of advertisement. And it is possible to transmit and receive data among smart-devices quickly, because it uses P2P communication among smart-devices that the application has been installed.

By applying this technology, it is also applicable to the field of delivery of movie or broadcasting contents. But the copyright issues of contents have to be solved firstly.

Further, it is possible with the help of a touch screen technology that is built into the smart device recently to provide interactivity between content and user. Basically, we can dissect the content through the scale up/down and rotation of contents. It will be able to apply directly to the content of the clothing to put the own face photo into advertisements using the camera function that is basically supported in smart-devices.

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