

Implementation of Smartphone System using QR Code in Mobile Environment

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Abstract

Smartphone subscribers exceeded 20 million people, 'Smart Korea' is up on this track, and leaping to 'Smart powerful nation' from 'IT powerful nation'. Of course, the popularization of the smart phone called 'PC in the hands' has brought a revolutionary change to nation livelihood, and also to business and government, too. The current usage of Smartphone is not just a simple function call, people can communicate anytime, anywhere with it. And it has become the culture of the terminal type in the hands whenever and wherever. However, the screen size and the existing flash or video files do not run when trying to access to the homepage for PC with Smartphone. and it may gives the inconvenience to people who use mobile devices. Therefore, in this paper, it is a study for the provision of an efficient service for Smartphone users through the establishment of website for mobile in mobile environment.

Keywords: Smart Environment, Mobile Web, QR Code

1. Introduction

Smartphone subscribers exceeded 20 million people, 'Smart Korea' is up on this track, and leaping to 'Smart powerful nation' from 'IT powerful nation'. Of course, the popularization of the smart phone called 'PC in the hands' has brought a revolutionary change to nation livelihood, and also to business and government, too. A certain marketing research site says on Feb 28, 2012 that twenty six million mobile phones can be in use, based upon its research performed in Oct 2011. The research says that this number of increase is 4% more than the number in year 2011, and is similar to 3% of increase in last year. Among the number, more than twenty three million smart phones can be used. And when mobile-phone makers and LTE vendors are getting in competition with each other, the actual demand for smart phone is expected to exceed it. And it is expected that the user of age 20's will exceed 90%, and that even the user of age over 50, who has lowest percentage in use, will get close to 70%. The current usage of smart phone is not just for a simple function of call, but people can communicate anytime, anywhere with it. And it has become the culture of the terminal type in the hands anytime and anywhere.

When opening pre-existing homepages with mobile devices, the screen size looked through mobile devices doesn't fit at all, and it causes the users to feel uncomfortable very much [6, 13-14]. This is the very reason why the demand for homepage in mobile environment is increasing rapidly. Especially, most of flash files and video files posted in the pre-existing homepages do not work with the mobile setting homepages, which causes mobile device users to feel uncomfortable. Thus, it is necessary to develop the homepages that are relevant to mobile devices and to provide them to the mobile device users in order to resolve their discomforts in accessing the pre-existing homepages with

mobile devices. Now, both public institutions and non-public institutions are building mobile setting homepages more, and to build up mobile setting homepage is not an option to choose or not to, but a mandatory itself [1-3, 12, 14]. Therefore, this study deals with how to increase the effectiveness of user interface in mobile environment using QR-Code.

2. Related Work

2.1. Necessity of Mobile Web-Page

Because of the explosive use of smart phone and the rapid growth of mobile web, it became necessary to plan marketing strategy targeting for smart phone users. Changing and adjusting mobile environment is necessary in the time of twenty million personal users of smart phone and explosive mobile web usage which requires people to access mobile web pages frequently more than the web pages which are for PC[2][11][15]. And the 20's to 40's, who are main smart phone user band, emerged as the major target of all marketing, and it's necessary to plan marketing strategies which are relevant to the ages, such as designing the screen size and user interface which are more fitted to mobile environment. Again, urgently, it is necessary to develop mobile web pages, because the pre-existing homepages for PC have many limits and restrictions for the mobile device users to see them on mobile [1, 9-10].

What happens negatively when using the pre-existing homepages and web-pages with mobile devices are as follows:

(1) Slow loading due to overload

Because Wi-Fi and 3G network speed is slower than LAN speed, loading the web-page for pc setting on mobile requires more time and makes it slower.

(2) Unworkable application

Flash files and video files, and so on, which are used in the pre-existing homepage, don't work on some cases of mobile devices; those should be replaced with other applications or should be redesigned if they are to be used.

2.2. QR Code

2.2.1. Definition of QR Code: QR Code is made of check pattern colored black and white which is two-dimensional matrix of barcode having information. QR Code has been used popularly in Japan, invented by the development department of Denso year 1994, credited with JEIDA standard Mar, 1998, and credited ISO/IEC 18004 June, 2000. Denson Wave has the patent right of QR Code but declared that they will not claim any right related with the QR code so that anyone can use and develop a system using QR code with no license limit. The feature of QR Code is to scan and read the variety of data which includes number, alphabet, Chinese character, and binary date and to save them with use of digital camera and scanner. Also, QR Code can correct the code, which is defected or scanned wrongly, and can recover them up to 30% [4-6].

2.2.2. Use of QR Code: QR Code is used widely in marketing, advertisement, and public relations. The most typical way of QR Code usage is on-line shopping mall that provides payment service, coupons, and other information through QR Code.

Thus, the ways of using QR Code can resolve the limited information problem which the pre-existing way has had, because of too small space to include much information to show. In case of advertisement outside that can't show the additional information in small space, QR Code can insert the additional information into it and deliver the detail information to the users [4]. In case of election campaign, by scanning QR Code on the business card of the candidate, voters can access right away to the candidate's blog and homepage and can learn about the voter. Like this, the strong points of QR Code are to access pretty quickly, to insert much information into even smaller space, and to be widely used in a variety of fields and areas [7-8].

3. Mobile Web-page designing and its realization by making use of QR Code

“QR Code Content Generator System” presented by this study can make QR business card design more easy and better way to express personality with the business card for personal public relations on a small scale and can help to produce the specific contents that are needed by companies, institutions, and government offices on a large scale. And it is expected that the small businesses, which are lack of technology and processing ability, can reduce the period needed for contents production and can increase predictability so that they can maximize their sales.

3.1. Aims of Technological Development

This study is aiming at technological development as follows. Differentiated from QR Code Content Generator provided by existing portal sites, which are somewhat uniformed and monotonous, this study intends to develop QR Code Content Generator System, which is somewhat differentiated because of free area division type in the process of contents production and because of free positioning function through the image inserting and text dragging method in using JAVA and jQuery Framework.

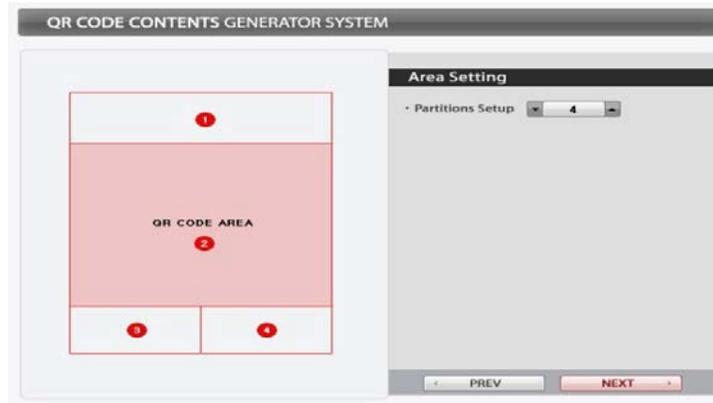
- providing the mobile skin by industry type
- providing the function to select content by user
- providing the function to divide content area freely by user layout when designing content area
- providing the function to position image freely by using dragging
- providing the function to directly correct by user after completion

3.2. Generating QR Code

Unlike the pre-existing portal sites that provide free QR Code service which is somewhat uniformed and monotonous, QR Code Content Generator System provides a variety of templates and is available to use interface freely in content production. What the way presented by this study makes difference the most from the pre-existing way is to make free positioning the interface dividing in content production using mouse dragging in content boundary, such as image and text. It uses JAVA as a development language, and it develops the way that is designed to express correctly the divided cell's width/height ratio by using tooltip library, express a variety of color by using Color Picker which is jQuery library, and adjust size by moving the boundary of image with resize-handle or by inputting pixel number.

- providing the mobile skin which is customized to user

- providing the function to select content by user (image, text, division function)
- providing the function to compose and to divide content freely



- providing the function to position content (image and text) freely

Figure 1. Partitions Setup

Figure 1 is the user interface about Partitions Setup, and instructed as follows:

- ① Call the template which is ready-made along with setting value by use of function `hide()` and `show()` that are included in jQuery library
- ② Partition size can be adjusted by using `Onmouse-up`, `Onmouse-down`, and `Onmouse-move` during Javascript event
- ③ Going next step, send the setting value by using the post method in form

Figure 2 is the user interface about decorating of QR Code, in which user can generate URL, change QR Code color, and insert image into QR Code, and instructed as follows:

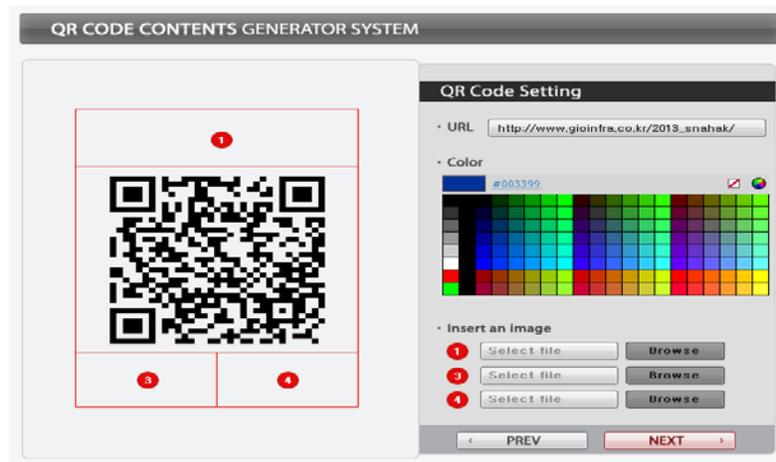


Figure 2. QR Code Decorate

- ① In case of generating URL, when onBlur(occurs when losing focus) occurs during javascript handler, the preview automatically changes its view connected currently with QR Code by use of ajax transferring system.
- ② Color change is automatically made by using Color Picker which is jQuery library and applied currently on the preview connected with QR Code by use of ajax transferring system.
- ③ Image can be inserted with the id for the partitions into the partitions. When inserting image, the id of image is saved temporarily into j server, calling the temporary file, and inserting the image into the partition which is matched with the id by using jquery.
- ④ When moving next step, transfer the previous partition setup data and the value for this view together by using the post method of form.

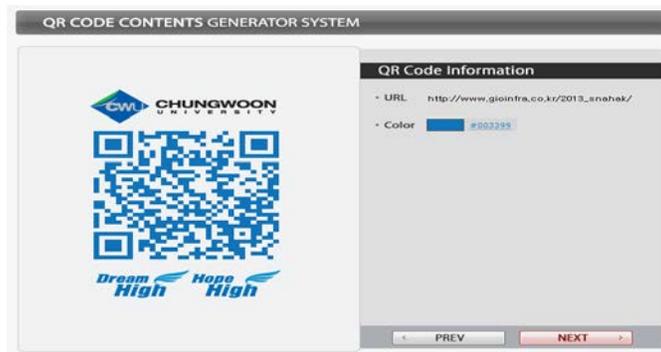


Figure 3. Completion Screen

Figure 3 is the view of completion screen of QR Code, and instructions are as follows:

- ① This preview shows the previous partition setup data and the value for this view by using javascript based upon the values transferred to form.
- ② When completed, the partition setup data and this view setup value are transferred together and saved in DB

3.3. Generating Content

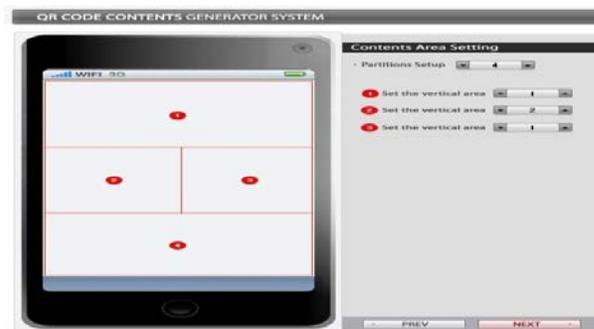


Figure 4. Contents Area Partitions Setup

Figure 4 is the user interface about Contents Area Partitions Setup, and the instructions are as follows:

- ① Remove and add the contents along with the partition by using partition setup jQuery library append.
- ② When moving next step, transfer the setup data by using the post method of form.

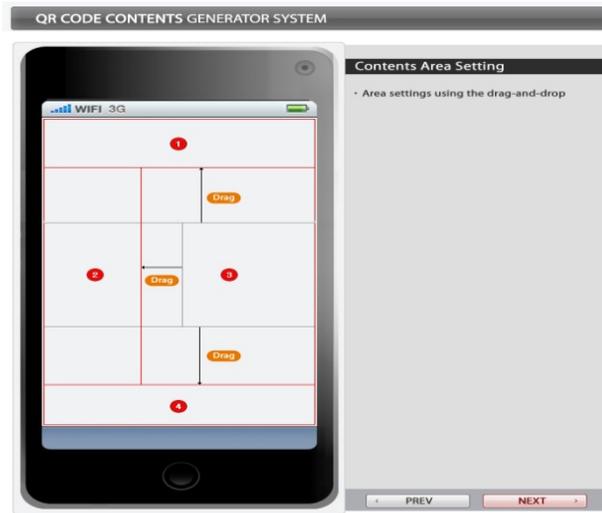


Figure 5. Area Partitions Setup [Core Technology]

Figure 5 is the user interface about Area Partitions Setup which is the core technology with adding Javascript Event, and the instructions are as follows:

- ① The each size for partitions can be adjusted by using Onmouse-up, Onmouse-down, and Onmouse-move of Javascript event.
- ② When moving next the step, transfer the previous partition setup data and the setup data for this view together by using the post method of form.

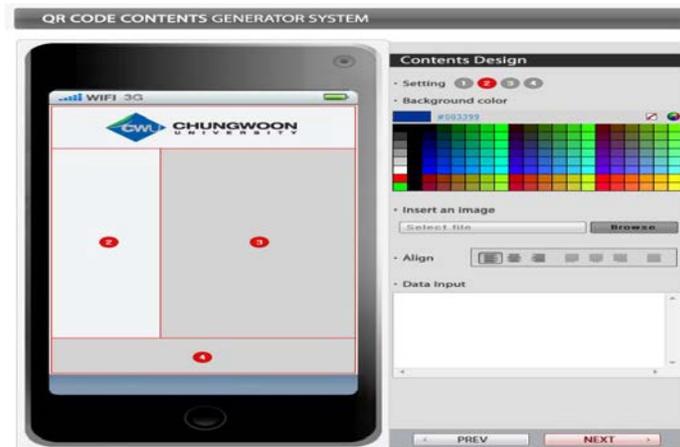


Figure 6. Contents Decorate

Figure 6 is the user interface about Contents Decorate in which the user can add background color setup and can add functions such as image inserting, text inserting, and so on, and the instructions are as follows:

- ① In case of generating URL, when onBlur(occurs when losing focus) occurs during javascript handler, the preview automatically changes its view connected currently with QR Code by use of ajax transferring system.
- ② Color change is made by using Color Picker which is jQuery library and applied currently on the preview connected with QR Code by use of ajax transferring system.
- ③ Image can be inserted with the id for the partitions into the partitions. When inserting image, the id of image is saved temporarily into j server, calling the temporary file, and inserting the image into the partition which is matched with the id by using jquery.
- ④ When moving next the step, transfer the previous partition setup data and the setup data for this view together by using the post method of form.

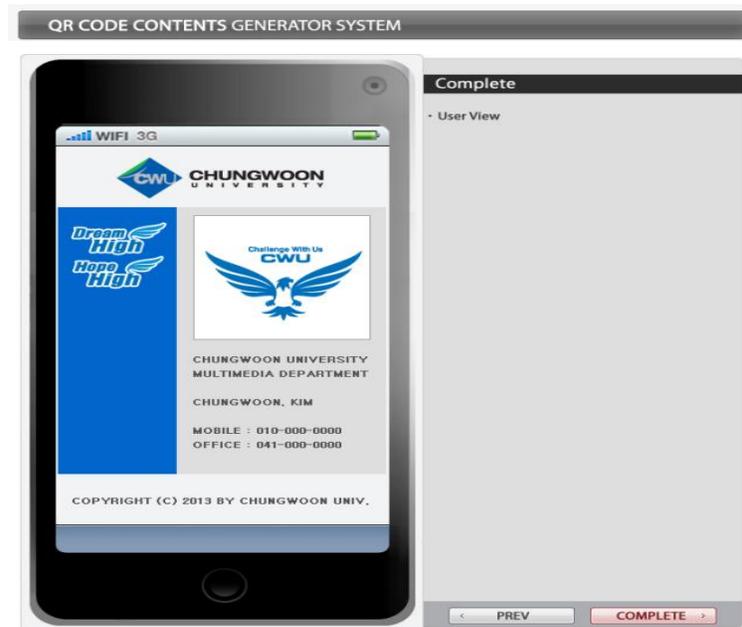


Figure 7. Mobile Device Application [Completions]

Figure 7 is the user view displayed finally on mobile device, and the instructions are as follows:

- ① This final preview shows the previous partition setup data and the value for this view by using javascript based upon the values transferred to form.
- ② When completed, the partition setup data and this view setup value are transferred together and saved in DB

4. Conclusion

“QR Code Content Generator System” presented by this study can be used mainly by the companies that employ a lot of salesman, the industry needs more personal mobile web-page, and businesses which need mobile web-page as business card as well. Also, it can be used for the public institutions which need mobile services for the people, and we think it is possible to make profit by providing those systems using “QR Code Content Generator System” to the public institution. After upgrading and make up this system, we will apply a patent on this system.

After completing development of this system, we will make a website “QR Code Content Generator System” and promote it through portal site keyword search, on-line ad, and marketing to form individual customer group, and we will send flyer and catalog by mail to the public institution to make institutional customer. Later on, by the time when obtain the DB for a lot of customer, we will build a website that categorizes the customer’s QR Code by business group, region, and theme, and then we are going to enter on-line ad market place.

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