

Interacting with Digital Signage Using Reverse QR Codes for Direction Guidance

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Introduction

One of the outstanding benefits of digital signage is providing local place information, maps and direction guides to the passersby. Interactive technology have made is possible to access personalized information.

Our approach for providing a personalized, immediate, yet distant interaction with the digital signage is by using QR code scanning the other way around which we defined as Reverse QR code scanning (RQR). Conventional QR code scanning approach is an interaction technique for "information take-out", whereas the smartphone serves as the code scanning device reading the QR code presented on a display or a paper (Figure 1-A). In RQR, smartphone serves as a QR code and the digital signage as the QR code scanner (Figure 1-B).

Prototype Implementation

A prototype system were designed and implemented to support a way-finding scenario during a conference. We designed a web-based digital signage showing a map of the conference building with detailed zones and room number information. We equipped the digital signage with Microsoft Lifecam Studio, a full-HD webcam. Android application was developed on Jelly Bean platform with a support of Google map v4 API receiving text input for target location search. The web front-end was implemented using PHP and JQuery libraries to provide users with dynamic effects. The back-end remote server using Node.js module and MySQL database interfaces with our mobile application to transfer data related to a way-finding.

Preliminary Evaluation

Six participants were recruited for preliminary evaluation of our two prototypes. The participants were counter-balanced in the trial sequence between the QR code and the RQR code based interaction techniques. They were tasked to find a lecture room within the floor. Two digital signage were placed at a distance of 10 meters. The first digital signage placed at the starting point was showing a general map of the whole conference rooms.

In the RQR based interaction task, they first searched for the target location on the Android application and acquired the distinct QR code. Then they could face the QR code toward the digital signage for registering the target location. Digital signage then displays the target location's direction using an arrow sign. Along the way to the final target place, they were asked to execute the same procedure one more time.

In the QR based interaction task, they used a commercial QR code decoding application called Eggmon downloaded from the Android market. They were asked to acquire the connection between the mobile device and the signage by scanning the QR code displayed on the digital signage. Then as they search for the target place, the digital signage displays the corresponding arrow for direction guidance.

After each interaction technique performed, recorded a survey on perceived ease of use using 7 point Likert scale. Also a post-questionnaire was conducted comparing the two interaction techniques.

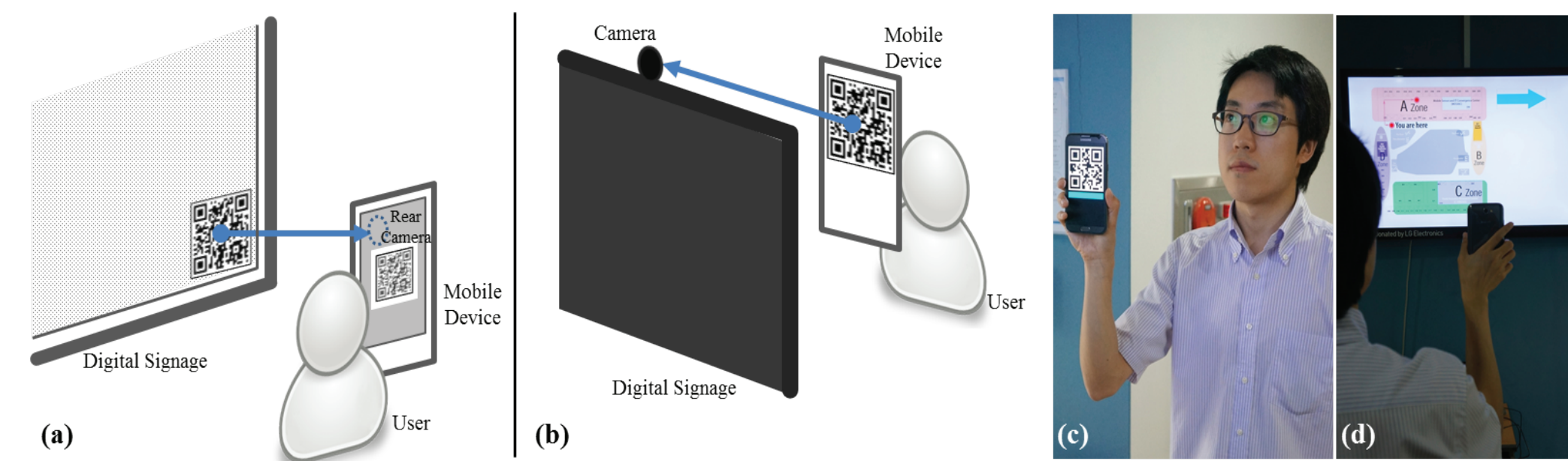


Figure 1. (a) Conventional QR code scanning (b) reverse QR code scanning (c) By searching a target location on the mobile device, corresponding QR code is displayed on the mobile display. (d) Digital signage provides a direction guide upon the reverse QR code request.

QR VS REVERSE QR

Advantages of using RQR over QR are as follows:

- No need for placing a QR code on the digital signage, leaving the screen fully available for displaying content.
- Longer interaction distance is available due to more powerful camera installed on the digital signage.
- Multiple users (QR codes) can be scanned by the digital signage simultaneously for single display multiple user in-teraction.

Results

The results show that the ease of use for RQR (4.8) out-performed QR code scanning approach (2.83). Although the both techniques involved same number of interaction process levels (start application, search and select target location, QR code scanning gesture), 5 out of 6 participants perceived that RQR approach required less process of achieving the task goal and only 1 participant answered "same". Some of the free-form feedback from the post questionnaire was that QR code scanning made their sight concentrate on the mobile display only and RQR on the digital signage. Also bringing the mobile device close to the QR code to scan made them perceive the interaction area is very limited. On the other hand, RQR was considered wide and free in interaction.

Conclusion and Future Works

In this paper, we described reverse QR code scanning, an interaction technique for interacting with digital signage. The RQR is efficient in a repeated interaction with the digital signage. Moreover it is more reliable and stable than the QR code scanning due to the powerful computing and camera capabilities. Also the static nature of the digital signage promises an accurate location and direction data compared to that of mobile device on its own.

Our current prototype only serves one user at a time at a distance of 3 meters maximum. Our future work is to extend the user capability as well as the distance factor for more reliable and efficient digital signage services. We also expect to enable new interaction methods using RQR approach.

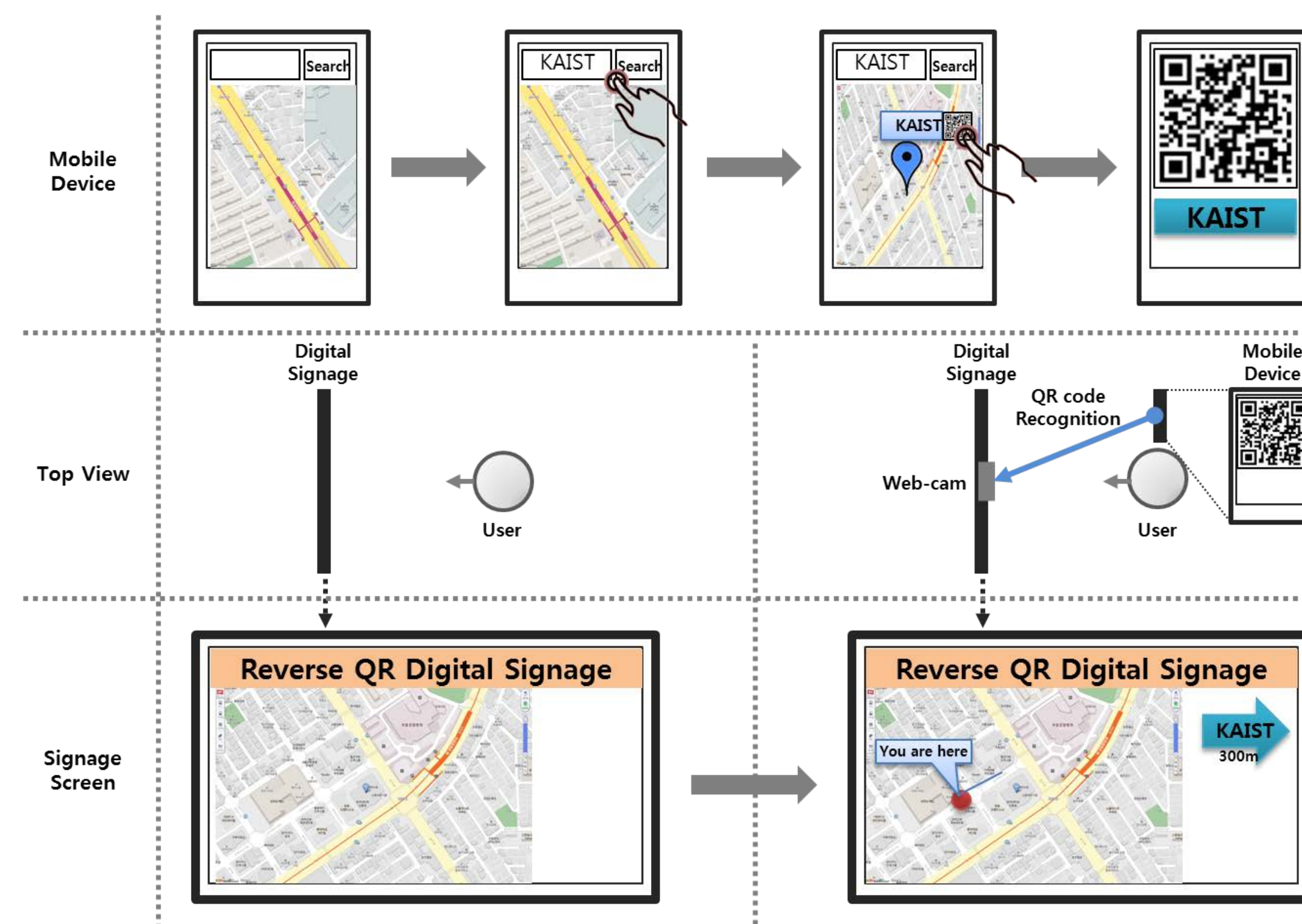


Figure 2. In the RQR based interaction task, they first searched for the target location on the Android application and acquired the distinct QR code. Then they could face the QR code toward the digital signage for registering the target location. Digital signage then displays the direction and additional information of the target location using an arrow sign.