

# Fun-Game Application to create Interactive and Attracting Museum using Mobile Phone and QR Code Tags

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**Abstract**—Museum have a very important role to give understanding and knowledge of human historical and civilization. On museum people can learn the development of human civilization, art, history, and technology. Unfortunately museums are often still perceived as uninteresting and boring place to go. This research try to develop an interactive information and fun-game on the museum using mobile phone application and QR code technology. The fun-game will delivered to visitor by give them a riddle question and also using silhouette guess game about the artefact in the museum. The visitor will answer the question by scan the QR code tags that attach on the museum artefact.

**Keywords**—QR Code; Fun-game, Museum; Interactive; Mobile Phone

## I. INTRODUCTION

To improve understanding of historical relics, art and culture, or human civilization. Museums have a very important role. On museum people can learn and understand the development and evolution of human civilization. Unfortunately museums are often still perceived as uninteresting place, boring things, and irrelevant to the present [1, 2]. The development and promotion of the museum also mostly still use the old way such as with a board display, writing and drawing on paper, etc. There are still very few museums that use today's technologies such as websites, mobile phone apps, Internet of Things (IoT), augmented reality or even holographic technology.

One of the obstacles that faced on technology development on the museum is the technology often requires substantial cost. This is particularly troubling especially in developing countries where the level of demand for life is still high. So, it is worth to find a way to develop the museum into an attractive tourist location, interactive information, and using current technology but with inexpensive cost. Therefore, this research we try to develop an application on mobile phone technology and also by using QR Code to create interactive information and also fun-game to explore the museum. This application is intended for museum visitors to be able to explore the artefacts that exist in the museum while playing game using their mobile phone.

Museum applications can be simply installed on the visitor mobile phone (user). Then, the application will ask questions about any objects in the museum. The answer from the user is given simply by scanning the QR code that has been attached to the objects in the museum (using their mobile phone application). So, the museum visitor is expected to do a fun game (the quest) as well as explore the museum and also learn about the objects/artefacts that exist in the museum. If the answer is correct then the user will get the game points. The QR code will simply generate and attached to the any artefacts that exist in the museum. The QR code will give the information about the artefacts that used to answer the question.

Applications that created can include not just one museum data but more than one museum. So, this application could be use for any museum on the country. Users can download any museum data as they desired. Then, they can visit the museum and have fun (but also learn the information) on that museum.

For the experiment, the research data is applied to the 10 November Museum (Museum Perjuangan) in Surabaya, Indonesia. This museum is a museum that contains the relics of war of independence in Indonesia, especially in the battle of 10 November 1945 in Surabaya. This museum contain the artefact of war such as weapons, soldier uniforms, etc.

Quick Response Code or also often called QR code (Figure 1.c) itself is a two-dimensional barcode which is a machine-readable optical label that contains information that attached to it. QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera. QR code is widely used for purposes such as item recognition on warehouse, website URL code promotion, etc. QR code is also used for a few games such as The Talos Principle that running on Linux platforms, OS X, Windows, Android, iOS, and PlayStation 4.



Fig. 1. Identification Tags

Beside the QR code, there are several alternative (other tags) technology that could be used, such as RFID tags and NFC tags (Figure 1). Both of these technologies have advantages where the tags also can store information (not just representative the code only). But both of these technologies require specific devices to access the information. It also takes special tools and expertise to enter information into tags.

Besides that, the equipment and tags also still relatively expensive. Unlike the QR code technology, which does not require special equipment to create QR code. Administrator could generate the QR code tag by accessing websites that are widely available on the internet such as on [www.qr-code-generator.com](http://www.qr-code-generator.com). This QR code then simply print on common paper in varying sizes that eye-catching to the visitor. For reading the QR code, users can use the camera facility that usually owned by common mobile phone and access it by using the application.

## II. LITERATURE REVIEW

The use of technology to improve the facility in the tourism sector has been done such as using website technology [3], audio on mobile phones [4], SMS on mobile phone [5], mobile phone multimedia applications [6], NFC [7], and Location Based Services for Surabaya on battle tour applications [8], etc.

On the other hand, the use of QR code for improving user engagement in the tourism sector has also been done such as [3] which incorporates website technology, 3D display, and QR code to create interactive applications on tourist guide. Sanagustin [9] using QR code that can be accessed by the mobile phone then to provide information to the user through the information on the website. This information is provided for museum-like space such as a city park or other open space. Chivarov [10] also uses a portal website to display additional information on museums that triggered by QR code.

From the applications that already have been made, we see there is still big opportunity to implement a fun and also an educational application at the museum using mobile phone application and combine it with QR code. Where the fun-game application is created to improve the interaction between visitors and museum objects/artefacts, creating a fun visit, as well as increase the willingness to learn about the objects that exist in the museum. This game-application will asking a question/riddle/etc. about any object/artefacts on the museum to the user and user will answer it by scan QR code that attached on it.

## III. IMPLEMENTATION

First the user can select the museum that they want to be visited from the list of existing museum data on the application (Figure 2.a.). Once selected, user can view and download the information data from that specific museum (Figure 2.b.).



(a) Museum List Menu



(b) Museum General Information

Fig. 2. Museum Information

After selecting the museum to be visited, user can choose the game to be played from games in the application (Figure 3). There are 4 kinds of games that available are silhouette adventure, riddle quest, quiz, and sliding puzzle. Quiz contains questions about knowledge of information (from artefacts and history in the museum) as shown in Figure 4. While sliding puzzle will contain the game of arranging the puzzle image to be the right picture.



Fig. 3. Games Option



Fig. 5. Silhoutte Image List

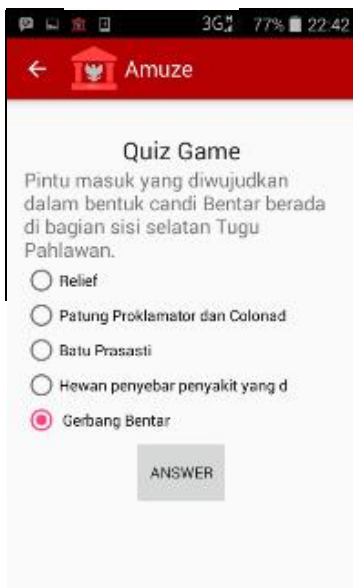


Fig. 4. Quiz

Special for silhouette adventure game, user is assigned to guess and look for objects that seen on the silhouette image list (Figure 5). User answers the question by scanning the QR code tag that attached on the artefacts (Figure 6). By this method users will interact with objects in the museum.



Fig. 6. QR Code Scan for the Answer

There is also a riddle quest game (Figure 7), where the user will guess the object that asked by the question. The user will also answer the question by performing a scan of the QR code that exists on the object. When the user answer is correct, then the user will get points that later can be exchanged to the museum to get a reward.



Fig. 7. Riddle Quest Game

Finally, our try to test this research to 50 museum visitors, with 10% respondents from range age 5 to 10, 25% respondents from range age 11 to 20, 50% respondents from range age 21 to 40, and 20% respondents from range age 41 to 50. All respondents considered that this game application has been able to make their visit to the museum more interesting. The silhouette guess and riddle quest game get the first and second rating as the game most appealing to the respondents. Respondents assess this game is able to attract the visitors to go around the museum and understand more about the artifacts in the museum. So, we could conclude that this fun-game application using mobile device and QR code could give a fun, exciting, and interesting visit for museum visitors.

#### IV. CONCLUSION AND FUTURE WORKS

In this research we trying to implement a fun-game application using mobile phone application and QR code on museum. Application and game that build have a purpose to increase user interactiveness on museum and also to create a fun and interesting visit for museum visitors. Visitors can play games using their mobile phone and answer the question by scan (using camera on their mobile phone) the QR code that attached on the museum artefacts. Games that build using mobile phone application and QR code tags will increase the visitor interactive to the museum artefacts and also make visitors learn more about artefacts that exist on the museum. The application will using a silhouette image or give a riddle from the museum artefact and then visitor will guess what artefact is it and answer the question by scan artefact QR code tags with their mobile phone. This will make the visitor go around trough many location in the

museum in order to find the answer. Also, visitor learn a little bit more about any artefacts that store in the museum.

So, this application will give a fun and interesting visit to the museum and also indirectly a learning tools for the visitors. In the future, this research could be improve by using another IoT device such as bluetooth beacon to give information notification to the visitor mobile phone. Beside that, this research could improve by using location based services to mapping user movement in the museum. By this information we could gather the knowledge which artefact location that visitors spend most of time.

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