ENHANCING USER EXPERIENCE IN INTERACTIVE DIRECTORY KIOSK WITH VIRTUAL WALKTHROUGH

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2.1 INTRODUCTION

Interactive kiosk is an information platform featuring specialized hardware and software which can be found almost in public exhibition. It serves the purpose of providing information to users for communication, health, commerce, entertainment, and education. Directory kiosk is other types of information kiosk that allows the user to find certain location or rooms within the building. This kiosk becomes a centre of attraction and it is located at the main entrance of the building and publicly accessible by the user to find information. The users are also diverse in terms of their skills, experience and expectation in using the kiosk (Maguire, 1999). For that, instead of achieving the usability goals, providing a quality of experience in kiosk development process is very crucial and become a challenge to the user experience (UX) and user interface (UI) designers.
Faculty of Computer Science and Information Technology known as FSKTM is one of the faculties in Universiti Tun Hussein Onn Malaysia (UTHM) located in Parit Raja, Batu Pahat, Johor. FSKTM is a big building consists of administration room, laboratories, lecturer rooms, post-graduate rooms, tutorial rooms, seminar rooms, auditorium, data centre, server rooms and other facilities rooms. There is always a difficulty for visitors or new students to look for any room in the faculty. Currently, FSKTM only provide a directory board and does not possess any digital directory to view every location in the building.

Previously, there is an existing kiosk system namely “Peta 3D Fakulti Teknologi Maklumat dan Multimedia (FTMM)” built for the former FSTKM (Ishak, 2006). However, this existing kiosk is developed according to building structure of city campus located outside of UTHM main campus where the structure of the building is completely different from the current building. In addition, the existing kiosk is still lacking in term of the usability and user experience elements where the 3D approach of the existing kiosk is deficient in the sense of virtual reality for the walkthrough purpose. The interaction approaches used in the interface only the simple buttons and message box. Other than that, the kiosk is also unable to pin point the exact location of the room or lab when requested by the user.

Thus, this paper attempts to propose an alternative solution namely FSKTM Interactive Directory Kiosk using 3D virtual environment and directory walkthrough in order to overcome the limitation of current approach with better user experience perspective. For that, futuristic 3D model building will be used to replace the picture mapping from the previous hand-drawing map system with the purpose of increasing the value of look and feel and eventually able to attract user attention to fully utilize the kiosk. Interactive features will be accessed from the 3D model instead of frame work interface. More features such as audio guide
and different viewing points of the 3D faculty model are added for more realistic perspective. The proposed kiosk system will not only access information by searching but also with the user-navigation walkthrough with the aim of providing enjoyable user experience.

The rest of this paper is organized as follows: Section 2.2 discusses on user experience in kiosk design. The proposed approaches which are virtual reality and 3D modeling used in kiosk development will be explained in Section 2.3. Then, Section 2.4 presents the proposed kiosk namely FSKTMIDK and the result of user testing discussed in Section 2.5. Finally, the conclusion is stated in Section 2.6.

2.2 USER EXPERIENCE IN KIOSK DESIGN

Avoid frustration and attract user to re-visit the kiosk are two main issues that need to be handled by the user experience designer. In user-centered design, fulfill user needs are the most important thing that make the system or application fully acceptable by the user. Providing a kiosk with perfect functioning but neglecting the enjoyable elements will make the user frustrated and eventually the kiosk will be useless. “First impression” is very important to make the user happily explore the information and fully utilize the kiosk. Basically, there are many elements of the user experience that can be considered in designing interactive kiosk including the usability, the aesthetics, the content, the look and feel and the sensual and emotional (Rogers, Sharp & Preece, 2012).

Huffman & Cohen (2002) claimed that a common misconception in kiosk design is that fewer screens are better. With the limited number of screens, it will make the kiosk packed with information and options. Hence, simplifying the content on the screen is more important rather than reducing the number of
screens. In addition, it is also suggested to provide information in the kiosk’s functionality in an attract loop. The other important feature that needs to be considered by the designer is to include error prevention instead of displaying error message. Whereas, finding in Sandnes et al. (2010) demonstrated that the improvements of highest priority of the kiosk design include implementing one bilingual language version, pictorial representation in delivering information, visibility of the navigation button by using colors and horizontal positioning, scrolling should be replaced by direct selection and removed confirmation buttons. The result shows that the user interface is more robust, more tolerant to user mistakes, more intuitive and efficient to use. In Bohak & Marolt (2013), a few crucial parameters of user interface are used for designing a kiosk with good usability and user experience. The parameters include the font size, the image size, the button size and click duration. The other parameters considered in their study are the physical properties of the system, such as the screen size, screen resolution and distance to user. These system properties are used to optimize the parameters of user interface.

2.3 VIRTUAL REALITY AND 3D MODELLING IN KIOSK DEVELOPMENT

Nowadays, Virtual Reality (VR) has become a part of many sectors especially in computer technology. With the advance of technologies, humans are able to simulate real world environment into digital environment that able to view from different perspectives. Basically, VR is a three-dimensional manifestation of unrealistic world; computer-generated simulation, with the key technologies of Computation and Visualization (Saggio & Ferrari, 2012).

In directory kiosk development, VR is employed as a wayfinding mechanism. In order to implement VR in directory
kiosk, three kinds of wayfinding dimensional knowledge which are pointing direction point to a destination, identify the shortest route and selecting the correct map while detect the route to reach the destination are taken into consideration. As the result, it has proven that (in VR) a simple layout and legends (landmark and road) provide better dimensional knowledge. However, the physical aspect of landmark and road did not practically improve wayfinding technique (Cubuku & Nasar, 2005). Therefore, firsthand experience was suggested in walking through a large-scale environment to improve environmental knowledge into more effective wayfinding (Colle & Reid, 2000).

In order to create a more realistic VR environment, it is important to incorporate 3D graphics into the design. Three-dimensional (3D) in computer graphic is rendered from two-dimensional sketch before shading, lighting and depth are added to the drawing. 3D modeling is actually a technique to create an item from 2D image by adding physical value and able to view resemble in real world (Thormahlen & Seidel, 2008; Bae et al., 2008; Tsang et al., 2004; Kallio, 2005; Dorsey et al., 2007). 3D modeling gives off the feeling of space within the virtual environment where human can explore either approaching an item on the ground or flying in the sky to view the ground below. 3D modeling technique is to create digital item resemble to the real world. In directory kiosk application, 3D modeling is important whilst the arrangement of the 3D model is important as well to provide the actual spatial knowledge of real world. Hence, in directory kiosk walkthrough, 3D modeling acts as the object and boundaries especially a model of a building.

2.4 FSKTM INTERACTIVE DIRECTORY KIOSK

FSKTM Interactive Directory Kiosk (FSKTMIDK) is the proposed kiosk application. The methodology used in developing
FSKTMIDK is Prototype Model. Prototype Model consists of 6 phases which are requirement gathering, design, prototype development, evaluation, prototype refinement and deployment. Autodesk Maya 2013 is used to render 3D model of FSKTM building, while the software used to develop the kiosk is Unity 5.

Based on the requirement analysis, FSKTMIDK is developed in desktop-based and standalone platform to support the 3D content which requires a huge memory space. Besides, desktop-based application able to offer more enjoyable experience to the user with the size of the screen is more widely to present the information to the user. In order to enhance user experience when exploring the kiosk, wayfinding walkthrough is implemented by using virtual reality approach. During design phase, several design documents which are navigation structure, flow chart and storyboard are produced as proof-of-concept and reference documents during development phase. Figure 1 illustrates the navigation structure of FSKTMIDK.

![Figure 1 Navigation Structure for FSKTMIDK](image-url)
In designing a pleasurable interface, futuristic metaphor is applied in FSKTMIDK interface. The purpose is to increase user satisfaction level when using the kiosk. Based on Figure 2, FSKTMIDK consists of 3 main modules which are the Information of FSKTM, Virtual Wayfinding, and Room and Location. 3D navigation buttons are provided to access into these 3 main modules. The first module which is Information of FSKTM explains the background of FSKTM. The content delivered is in the form of video clip. The use of moving pictures instead of plain text and pictures is to attract user to explore further all information in the kiosk. In the second module, user navigation walkthrough is provided. In this module, 2 types of virtual reality walkthrough are provided which are manual walkthrough and automatic path-finding walkthrough. In manual walkthrough (shown in Figure 3), user navigates around the 3D environment by using button controller whereas automatic path-finding walkthrough (shown in Figure 4) using the animated path where the system will bring the users to the destination they chose through the button location.

**Figure 2** FSKTMIDK Main Menu
In both navigation walkthrough, users are able to view the inner part of the faculty building in Virtual Reality environment. Inside this module, users are also able to interact with the 3D components such as the door for each laboratory facilities. When a certain laboratory is selected, information of the room will show up on the wall next to the door or the information has been on the wall in the first place. The motion navigation button is provided on the
screen applying the joystick buttons concept. All these elements make the user feel as though they are in the real environment. Next, in the third module demonstrated in Figure 5, the implementation of 2D and 3D technique are to view the faculty building from a further distance. Every single level of FSKTM is rendered in 3D model. Each level is become isolated entity where the whole floor plan is able to view from the outside. Slider is provided to access each level of FSKTM. Zoom in and zoom out function is to view the area in a nearer distance of the building. Pop up information is also provided in this module.

![Figure 5 Room and Location Module](image)

**Figure 5** Room and Location Module

### 2.5 USER TESTING

The satisfaction level of user experience is evaluated based on two main components which are interface design component and VR walkthrough component. Evaluation is conducted on 40 respondents among FSKTM staffs and students.
Figure 6 shows that 85% of respondents agree that the interface design for the whole FSKTMIDK is easily to use and learn. The button is well design and functioning. While, text used to convey the information is readable and easy to understand. The respondents also agree that the responding time is fast enough with the use of touch screen function. From the component of VR walkthrough, more than 55% respondents agree the use of VR walkthrough in enhancing user experience in exploring the kiosk. However, the users are expecting for more details texture use on 3D object models for more realistic effect.

2.6 CONCLUSION

In conclusion, FSKTMIDK application has successfully developed and able to provide more functionalities as compared to existing kiosk. The 3D modeling and virtual walkthrough implemented in the kiosk able to provide pleasurable experience and eventually increase the level of user satisfaction. However, there are still having rooms for usability performance especially on walkthrough elements.
2.7 REFERENCES


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