The Heritage Palace Virtual Tour Application as an Interactive and Immersive Online Promotional Media

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Abstract. Information disclosure in the digital era has created a demand for easily accessible and meaningful information by the public. In this study, we propose the development of a web-based information system application for 360-degree virtual tours of heritage palaces. The primary objective is to offer the public an engaging and captivating view of these magnificent palaces. This application takes a panoramic image, created using the ORB image stitching algorithm, as input and presents it in a virtual tour format. Our research focuses on implementing the image stitching algorithm to provide a lifelike visualization of the dynamic 360-degree palace environment, creating an authentic experience like being at the actual location. The virtual tour approach offers a more immersive and appealing presentation compared to traditional photographs.

Keywords: virtual tour, immersive, interactive.

1 Introduction

Indonesia has extraordinary tourism potential and is a prima donna for domestic and foreign tourists. What's more, Indonesia has a wealth of natural beauty and various cultural and historical heritages. Tourism potential in Indonesia is one that can be used to support the economy. However, since the COVID-19 pandemic started in 2020, people's mobility has been limited. The closure of most recreational and entertainment venues that were previously opened as tourist attractions has had a major economic impact on the tourism sector in Indonesia. However, now that the level of COVID-19 has dropped dramatically in almost all countries in the world, including Indonesia, the policy on Imposing Restrictions on Community Activities (PPKM) has been officially revoked. With the repeal of PPKM and the success of the Indonesian government in suppressing the spread of COVID-19, of course this increases the sense of security for local and foreign tourists to visit tourist attractions in Indonesia again.

This momentum needs to be utilized as well as possible for tourism business actors in improving the tourism sector in every region in Indonesia. Marketing of tourism objects and packages must really take advantage of social media considering that society is increasingly dependent on information from the digital world [1, 2, 3].

Surakarta City or commonly known as Solo City is one of the tourism areas in Central Java Province which has a number of tourist objects. The various potentials possessed by the City of Surakarta are actually a pretty good step to increase regional economic independence, one of which is through the tourism sector. The Heritage Palace tourist spot, which is located in Kawedanan Sukoharjo, which is still part of the Surakarta City Regency, was once an old building, a former sugar factory abandoned by the Dutch government, but now it is an interesting and Instagram able historical tourist spot. The Heritage Palace tourist area is a tourist destination that is still relatively new, because it was only opened in 2018. Of course The Heritage Palace is a tour that needs it, especially because of the challenge of the COVID-19 pandemic since 2020, it has increasingly made this tourist spot rarely known by people, especially those outside the city of Surakarta. Even though the current cases of COVID-19 have decreased drastically, with the development of the digital world, The Heritage Palace tourism marketing and promotion should also use digital media. Applications to promote The Heritage Palace tourism are certainly needed to increase the interest of domestic and foreign tourists to visit, the development of virtual tour designs in the application is used to help promote The Heritage Palace through current promotion tools based on systems that are interactive and immersive and reach the market wider because it is online-based and can be accessed by anyone, anywhere.

Research on making applications to promote certain tourist objects has been done before, one of which is research by [4, 5, 6]. This research is to make the development of a Virtual Tour for the Mbencirang Valley Tour as an Interactive and Immersive Online Promotional Media for efforts to accelerate tourism recovery. Bringing up the same background regarding the problem of the decline in the tourism industry due to COVID-19 which has caused a decrease in the number of visitors and income during the pandemic. The researcher wants an online immersive virtual media in the form of a Virtual Tour for the Mbencirang Valley which can be used as a tool to reach a wider market. The researcher commented that optimizing virtual tours can be carried out by involving the community in compiling promotional material content and playing an active role in disseminating virtual tours online because virtual tours are web-based so they are easy to distribute and access through various types of devices that can be used to access.

The focus of this research is to create a virtual tour application for The Heritage Palace tour as an interactive and immersive promotional medium using the The Multimedia Development Life Cycle (MDLC) methodology comprises six distinct phases: Conceptualization, Design, Gathering of Materials, Compilation, Testing, and Distribution.. The difference between this research and previous research is the media creation platform used. In previous studies the end result was a website and in this study the end result was an Android-based application. Another difference is that in this research there is the use of the MDLC methodology which is suitable for multimedia-based applications because it has a more mature and more flexible planning structure because in practice the six stages can exchange positions according to the situations and conditions encountered during the research. This research also measures the usability quality of the application using the System Usability Scale (SUS) and the level of user experience using the User Experience Questionnaire (UEQ), so that the usability and stability of the application can be measured clearly. It is hoped that this research can become a media for promotion with neat delivery and

reach a wider market, especially the COVID-19 pandemic which has subsided and the repeal of PPKM so that the tourism sector begins to open up to many potential visitors who know and will visit The Heritage more. Palace.

The rest of this paper is organized as follows. Section II introduces virtual tour. Section III shows the proposed system. Section IV summarizes the technical challenges and the recent advances in this area. Section V concludes the paper.

2 Virtual tour

A virtual tour typically involves the replication of an existing location, often incorporating sequences of videos or static images [6, 7, 8]. It can also use other multimedia elements such as sound effects, music, narration, and text [9, 10, 11]. Virtual tours are developed as alternatives to traditional tourism [12, 13, 14]. Virtual Tour became very popular during the COVID-19 pandemic, because it became one of the media that tourists can still enjoy online. Virtual Tour is made by taking 360° panoramic photos at a number of different locations and points in a certain place so that it can produce unlimited or uninterrupted visuals in the form of a panorama [15, 16].

The Multimedia Development Life Cycle (MDLC) method is a method that uses and combines images, videos, and sounds in multimedia that are both interesting and arousing interest in a particular matter. Usually, MDLC was used to build virtual tour. MDLC is divided into six stages of activities carried out, namely: (1) Concept: This stage describes the purpose and concept of the application and identifies program users. (2) Design: This stage is the making of a design regarding the structure of the program, style or theme, appearance, and needs in making the application. (3) Material Collecting: This stage is the collection of materials according to the needs of the application being worked on. These materials can be in the form of images, video, audio, animation and others. (4) Assembly: This stage is the stage of compiling all the materials that have been collected. Application development is based on the design stage. (5) Testing: The testing phase is the stage of running the application and checking whether there are errors or not. (6) Distribution: This stage is an analysis stage for the development of finished applications to make them better.

3 Design System

System design has a function to explain the flow of processes that occur in the system. In addition, the system design aims to provide a general description to the user regarding the structure of the system being designed. In the system design section that will be explained includes use case diagrams, activity diagrams, entity relationship diagrams, database design, and user interface/user experience design of the application to be designed.

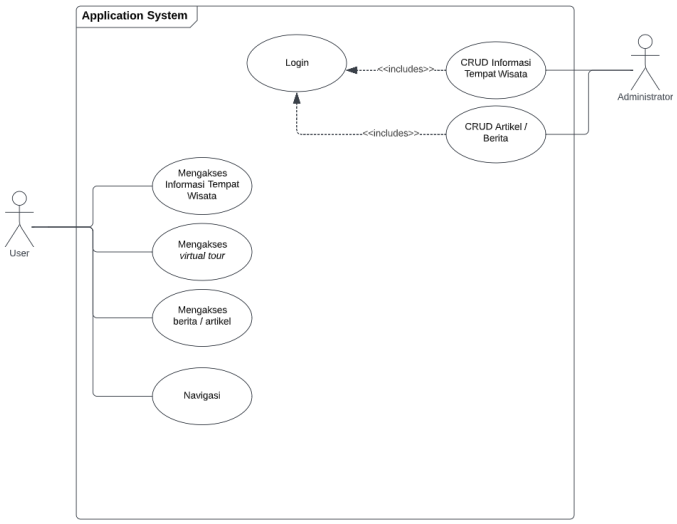

Fig. 1. Use case diagram of the proposed system

From Fig. 1 we can see what features 2 actors can do. Administrator can do CRUD information on tourist attractions and CRUD tourist news/articles. Meanwhile, user actors can access information on tourist attractions, virtual tours, news/articles and navigation. ERD in this application can be seen in Fig. 2.

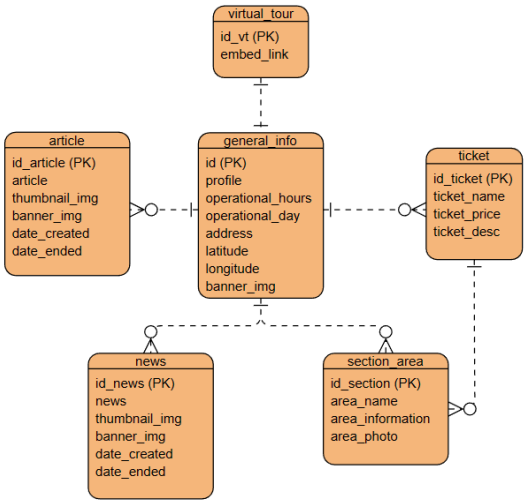

Fig. 2. Entity relationship diagram of the proposed system

The development of this application there are admins and users. Admins will access apps for admins connected to the Firebase Firestore database. The goal is that

the information contained in the database can be changed by the admin and can later be accessed by users (phones) through applications for users. Furthermore, the Internet will connect between the application and the user's cellphone. On the user's cellphone, it is connected to the Google Maps API to display the closest route navigation to The Heritage Palace tourist attractions and connected to 3DVista Hosting, which will display a Virtual Tour of The Heritage Palace tourist attractions. For an overview of the system architecture design in this application can be seen in Fig. 3.

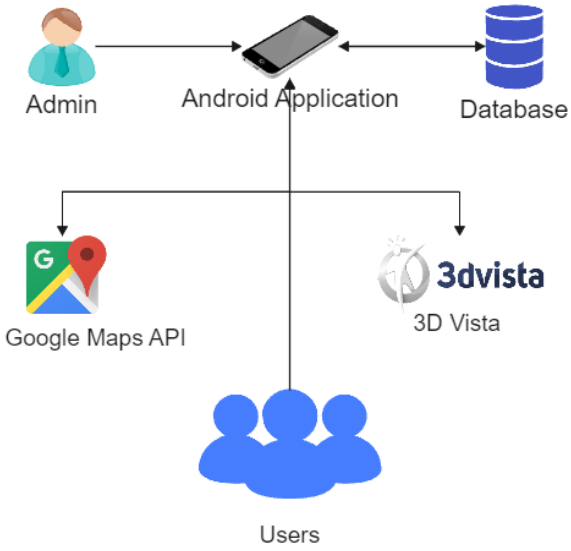

Fig. 3. Architecture design of the proposed system

4 Discussion

This chapter will discuss the testing of the application system that has been made both for the admin and also for the user. In addition, there is also a test of how good the level of usability and system is in this application as a tourist information medium for The Heritage Palace which is interesting and easy to use by users and also how good is the level of user experience from using this application. This android application is made using the dart programming language and with the help of Firebase Firestore and Firebase Storage as databases. During development process, Google Pixel 4 Emulator phone with Android 9 Pie was used.

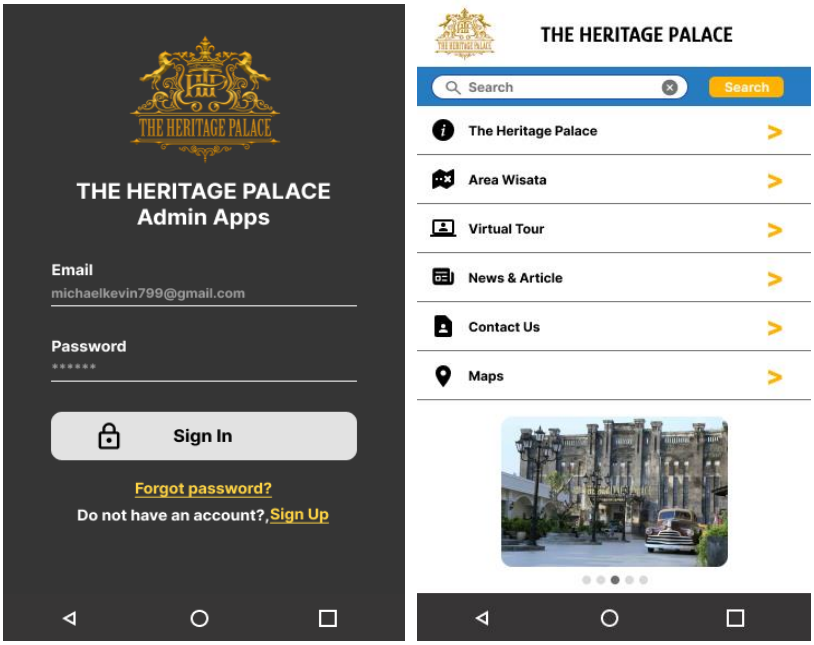

Fig. 4. Application page (a) Login, (b) Home

It can be seen in Fig. 4 (a), this page is the initial page when the admin application is run. There are 2 inputs in the form of an email and also a password that must be entered in order to be able to sign in. If the admin has never created an account at all, then he can carry out the sign-up process. However, if you have already created an account, all you have to do is input your email and password. If the process is successful, you will be redirected to the home page. If it fails, an error will appear. This page can be seen in Fig. 4 (a).

It can be seen in Fig. 4 (b), this page is the page the first time the user opens this application. This page contains a selection of several categories such as getting to know The Heritage Palace tours, tourist areas, virtual tours, news, contacts, and maps. The home page user interface design can be seen in Fig. 4 (b).

It can be seen in Fig. 5 (a). This page is the first page that will appear after the sign-in process is successful. This page contains a list of buttons to go to different pages. There are buttons to make changes to general information, area information, upload news, manage news and also sign out. This page can be seen in Fig. 5 (a).

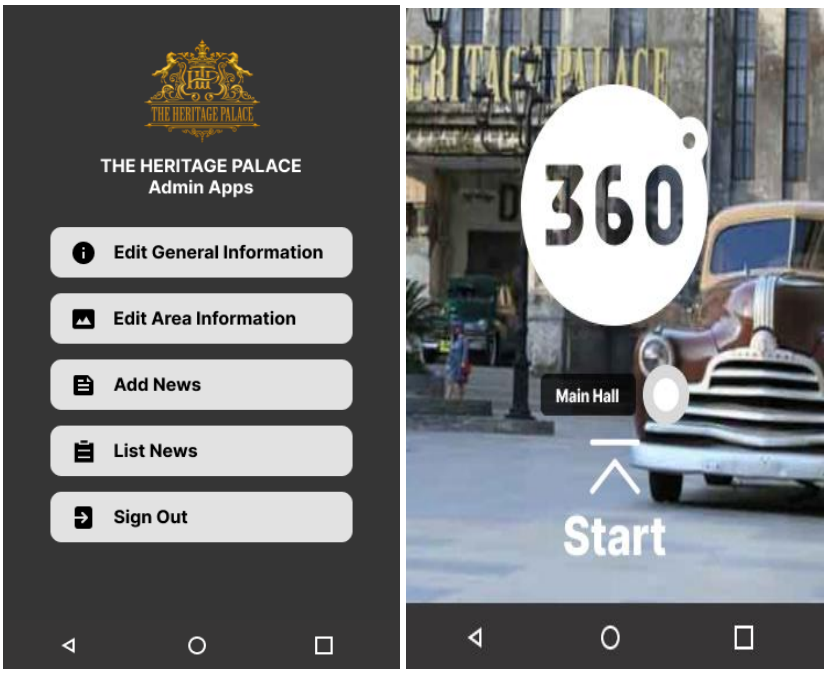

Fig. 5. User interface (a) admin page, (b) virtual tour

It can be seen in Fig. 5(b), this page contains a panoramic virtual tour that was previously made using 3DVista software. There are several navigations for moving spots, zooming in, zooming out, and changing the screen display to full screen. The virtual tour page user interface design can be seen in Fig. 5(b).

5 Conclusion

Based on the analysis and design of the android-based heritage palace tourism virtual tour discussed in preceding chapters, the following conclusions can be drawn: The application aligns with the anticipated features and functionalities, offering an attractive means of delivering information about natural attractions. Additionally, it effectively addresses the previous issue of uneven visitor distribution among attractions. Through this application, there is potential for an increase in the number of visitors to each attraction and a more balanced distribution. The application incorporates four components: information on tourism sites, a 360-degree virtual tour photo gallery, audio-guided directions, and a map pinpointing the locations of natural attractions connected directly to Google Maps. Furthermore, it was established that VR applications have a significant impact on the initial stage of the customer journey, where customers seek inspiration.

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