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VIRTUAL TOURS FOR ENHANCEMENT OF ARCHITECTURAL HERITAGE: A CASE STUDY KARAMAN FISANDON CHURCH

KÜLTÜREL MİRASI ZENGİNLEŞTİREN SANAL TURLAR: KARAMAN FİSADON KİLİSESİ ÖRNEĞİ

ABSTRACT

It has great importance in the preservation and presentation of cultural heritage that people from a wide range of societies can easily access historical buildings. Virtual tours have a significant role in the promotion and understanding of cultural heritage. Virtual tours are data aiming to access historical buildings and their information by using a smartphone, tablet, smart glasses, or head-mounted devices with the help of advanced technologies. Because of this feature, virtual tours have become one of the most used and popular information methods for cultural heritage. Because of the fact that historic buildings can be accessed quickly and easily online, it is considered as an important input in terms of introducing historical buildings and their surroundings. Thus, online data, which has a wide range of usage possibilities from education activities to tourism, has been stored in digital platforms and a database that could be created and stored for publishing with all stakeholders. In this article, a virtual tour with panoramic photos was prepared for the Fisandon Church located in Dereköy Village of Karaman province. During the tour, visitors can both access information about the building and take a virtual tour around and inside the building. For more details, they can access the prepared brochure with the help of a QR code. This study contributed to the worldwide access of the Fisandon Church; an important Byzantine structure located in the rural settlement. In conclusion, general evaluations were made about the advantages of virtual tours for promoting cultural heritage.
Keywords: Virtual Tour, VR, Panoramic Images, QR Code, Fisandon Church.

ÖZET

Toplumun her kesiminden insanın tarihi yapılara kolaylıkla erişebilir hale gelmesi, kültürel mirasın korunması ve tanıtılmasında büyük öneme sahiptir. Sanal turlar bu amaçla ileri teknolojilerin yardımıyla, bir akıllı telefon ya da tablet kullanılarak kolaylıkla tarihi yapılara ve hakkındaki bilgilere erişebilmeyi amaçlayan verilerdir. Bu özelliğinden dolayı sanal turlar çok kullanılan ve gün geçtikçe yaygınlaşan bilgilendirme yöntemlerden biri haline gelmiştir. Tarihi yapılara çevirim içi olarak hızlı ve kolay ulaşılabilir olması tarihi yapıların ve içindeki çevrenin tanıtılması yönü ile önemli görülmektedir. Böylelikle eğitim faaliyetlerinden turizme kadar geniş kullanım olanaklarına sahip online veriler dijital ortamda depolanarak ve gerektiğinde yayımlanabilecek bir veri tabanı oluşturulmaktadır. Makale kapsamında Karaman ili Dereköy Köyü'nde bulunan Fisandon Kilisesi için panoramik fotoğraflarla bir sanal tur hazırlanmıştır. Turda ziyaretçiler hem yapıyla ilgili bilgilere ulaşabilirler hem de yapının etrafında ve içinde sanal gezinti yapabilmektedirler. Daha fazla detay için QR kod yardımıyla, hazırlanmış olan broşüre erişebilmektedirler. Bu çalışma kırsal yerleşmede bulunan, önemli bir Bizans yapısı olan Fisandon Kilisesinin dünya çapında erişiminin sağlanmasına katkıda bulunması bakımından önemlidir. Sonuç bölümünde ise sanal turların kültürel mirasın tanıtılması ve benimsenmesindeki önemi üzerine genel değerlendirmeler yapılmıştır.
Anahtar Kelimeler: Sanal Tur, VR, Panoramik Fotoğraf, QR kod, Fisandon Kilisesi.

1. INTRODUCTION

In recent years, technological developments have remarkably increased also in cultural heritage metric data collection methods. With the help of advancements in the computer industry, three-dimensional visualizations of the monuments have been facilitated. In this context virtual tours have become quite significant in promoting cultural heritage. Since it provides access to cultural heritage through a virtual world, people are able to learn and discover cultural heritage regardless of distance. The collection of data for 3D models of historical monuments is simplified by dense point clouds created by terrestrial laser scanners. Similarly, automatic and semi-automatic image alignment platforms provide detailed 3D models for user purposes and sharing data via internet technologies (Korumaz, Tucci, Korumaz & Bonora, 2018).

Through the use of technology to promote cultural heritage, online access and awareness of people around the world have been provided. These new technological applications involve the use of databases, android systems, personal devices like tablets, smartphones, or 3D methods such as laser scanning, photogrammetry, and building information modeling (BIM) (Martínez-Graña, Goy & Cimarra, 2013). It could be said that over the last twenty years, special recording tools like photography, architectural stereo-photogrammetry, 3D modeling, and 3D laser scanning techniques only or integration of these techniques can be used in the field of cultural heritage. Among the approaches used to promote cultural heritage, Virtual Reality (VR) or panoramic tours are some of the most popular works. Virtual models are fundamental media tools that allow users to interact with 3D models in a virtual environment. A simple but efficient option for the visualization of complex objects in the virtual tour using panorama photography (Kersten and Lindstaedt, 2012).

The virtual tour is a method that uses 360-degree panoramic photographs. The application allows users to have a tour of the building and to zoom in on the details of the building with directions. In addition, to enrich the tour, information about the history of the building and photos can be added to the application as text (Maícas and Viñals, 2017). In the last years, VR tours have been created for both simple and more complex monuments. This ability has greatly contributed to the study of the monuments, as well as to the creation of virtual visits (Sofocleous, Ioannides & Ioannidis, 2006). Through some web agents, virtual visits have started to be organized for cultural heritage. Museums, exhibitions, libraries and cultural institutions provide new services to access information, related infrastructures, and tools. With the support of this kind of visit, people are able to build up virtual visits that can be joined by a different group of people interested in the same thing.

VR is a development of artificial (man-made) based computer technology that can be controlled by the user using the mouse. VR interactive key points lie in the hands of the user who controls the enjoyment of photos by moving the mouse or by pressing the keyboard (Prabawati and Triyuliana, 2006; Famukhit, Yulianto & Maryono, 2013). VR tour applications have been started to be applied in the cultural heritage field especially for documentation, preservation, reconstruction, decision support, and cultural heritage promotion. In the last years, particularly in the field of archeology, virtual models enrich interactivity besides visualization (Pavlidis, Koutsoudis, Arnaoutoglou, Tsioukas & Chamzas, 2007). This makes them become powerful tools for visualization and 3D reconstruction of archeological sites and finds (Bruno et.al., 2010).

This technology is also a supporting tool for sustainable tourism and cultural heritage management (Lettelier, 1999). Many visitors are not interested in the conservation of cultural heritage or many of them don't have any idea about cultural heritage management. In contrast, tourists and tourism companies, even the countries, would like to promote their cultural heritage for more visits. Virtual tours can become a kind of solution for this concern since they give the possibility to have visiting experience to the visitor. By visiting and learning cultural heritage, visitors may have more interest in the preservation and the values of cultural heritage.

With the possibility of displaying 3D models of cultural heritage, one can able to visualize, zoom and make a walkthrough of these models by rotating. Besides documentation and recording, it also helps to give information about lost heritage. Today many countries complain about their lost cultural heritage because of many factors. However virtual tours support to present tradition and culture through the cultural heritage and help to develop learning experiences with all stakeholders including experts and non-experts (Reffat and Nofal, 2013). It can be said that virtual panoramic tours have a significant advantage for experts, especially for conservators and decision-makers. In some cases, it can become very difficult to see the cultural heritage for several reasons. Because of safety problems, distance, or

some limitations, experts cannot reach cultural heritage. Even though they have to decide on cultural heritage, they could have some problems accessing all information. In similar cases, virtual tours can be useful to have such a kind of system especially shared on a database or website for decision-makers.

Virtual tours are mainly used in archaeological sites, museums, historical buildings, famous buildings. The virtual tours of the Louvre Museum, Oxford city and university, Eiffel Tower, Versailles Palace, Rome Colosseum are very famous in the world. In Turkey, virtual tours of the Ayasofya Museum, Cappadocia- Göreme Open Air Museum, Konya Mevlana Museum, Topkapı Palace Museum, Denizli Hierapolis Archeology Museum are also very famous. The London Charter provides 3D visualization methods, databases, documentation, objectives and computer-based visualization principles (The London Charter, 2009). The London Charter states that research resources (all information, digital and non-digital) should be defined and evaluated in a structured and documented way by researchers from different disciplines. The computer-based sustainability strategy provides preservation for future generations.

The objective of this study is to create a virtual tour of Karaman Fisandon church with panoramic photographs. This virtual tour enables people from all over the world to access the Fisanson Church by using technology. Thus, the rich cultural heritage of the province of Karaman is spread and shared with the help of this technology.

Software such as Autopano Pro, Autopano Giga, Panotour Pro, Pano 2VR, Google Street View provides different ways to create a virtual tour. Google Street View is an application that people around the world can use and create a virtual tour and take panoramic photos in the easiest way. This Google application allows people to contribute to cultural heritage. In addition, the location of the structures can be accessed from the Google Maps application. It also allows users who log in to the application to explore the building virtually with panoramic views and to tour in and around the buildings (Koehl et al., 2013).

In this study, panoramic photos were taken using the Street View application. In the Pano2vr application, a virtual tour was created with panoramic photos taken. The plan of the building has been added to the application so that users can follow the tour through the plan. Fisandon Church is an important Byzantine structure in a rural settlement. Providing remote access to the historical building is important for the promotion and protection of the building and to present the building to the world.

2. DESCRIPTION OF FISANDON CHURCH

Fisandon Church, now used as a mosque, is located in the village of Fisandon (Dereköy), 7 km from the city center of Karaman. Although the date of construction is not known exactly, it is thought that it was a Byzantine period between 9-10 centuries. The building, which has no inscription, was turned into a mosque by Yusuf Sinan Pasha (governor of Karaman), who died in 1573-1574, in the second half of the 16th century (Eyice, 1971, p. 84-85) (Figure 1, 2). The Fisandon Mosque is now one of the most important structures of the Christian period of Central Anatolia and one of the most valuable works in terms of art history (Eyice, 1971, p. 88).

Figure 1. City Center and Location of Dereköy Village, (Goggle Earth)

Figure 2. Fisandon Mosque General View, (URL 2).

The building was built in a typical Greek-cross plan type. The four square-shaped pillars on the inside of the church form this cross and support the dome. The pillars are connected to each other and to the

main walls by arches. The central area of the building is covered with a central dome. The four arms of the cross are covered with a barrel vault and the corner cells are covered with a cross vault. The cross vault that was not found in the buildings of Binbirkilise was used in this structure. (Eyice, 1971) Karpuz, 2009) (Figure 3,4). The Fisandon Mosque was built during the Byzantine period and is re-used as a church. The building has been re-used so that it has come until today. There is a Greek inscription over the entrance door on the northern facade. According to S. Eyice, the inscription reads: "This is the gate of the Lord / The righteous shall enter into it.". Animal figures were embossed (Eyice, 1971, p. 87).

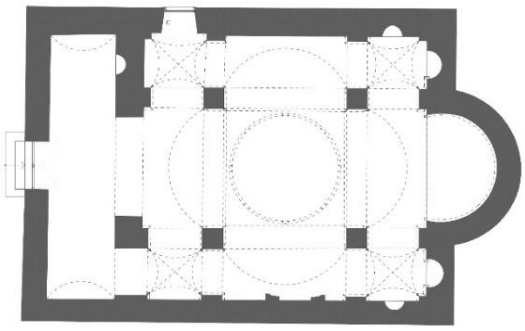

Figure 3. Restitution Of Ground Floor Plan (A Proje Architecture Restoration Report, 2006)

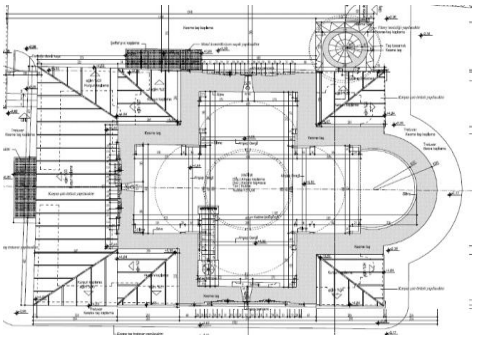

Figure 4. +5.50 Plan (A Proje Architecture Restoration Report, 2006).

Figure 5. Inscription Detail.

Figure 6. Scales, Sword and Scissors Paintings on the Western Wall (Eyice, 1971).

Figure 7. 1976 Eastern Facade- A Rosette-Shaped Cross (Konya Directorate of Reginal Foundations Archive).

Figure 8. Eastern Facade- A Rosette-Shaped Cross).

Figure 9. Cross Ornament Detail (A Proje Architecture Restoration Report, 2006)

There are frescoes, scales, swords, and scissors paintings on the western wall of the church about 70 years ago, but it has not survived. The rosettes and cross ornaments on the facades have not been changed and many have survived (Konyalı, 1967, p. 290) (Figure 6). On the pediment of the blind arch on the eastern facade, there is a rosette-shaped cross, embroidering and a cross-over again (Figure 7, 8, 9). The south facade is symmetrical with the north facade. Some of the arches show cross-embroidery and floral motifs over the rosette (Figure 10, 11).

Figure 10. South Facade Arch Detail

Figure 11. South Facade Arch Detail

3. VIRTUAL TOUR OF FISADON CHURCH

Using the Google Street View application, panoramic photos were taken by smartphone according to the command of the application and then they were saved on the phone (Figure 12, 13).

Figure 12. Google Street View App Interface.

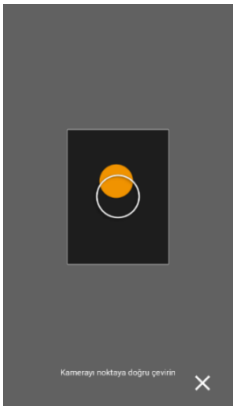

Figure 13. Google Street View Panoramic Photo

As a result, four main panoramic photographs were obtained from the façades and the interior (Figure 14, 15, 16). These photos have been imported to Pano2vr. After the plan was added, the scenario of the tour was created. The location of the structure was found on the map. The prepared plan was placed on the building (Figure 17).

Figure 14. The Northern Facade Panoramic Photo).

Figure 15. The Western, Southern and Eastern Facade Panoramic Photo

Figure 16. The Interior Panoramic Photo

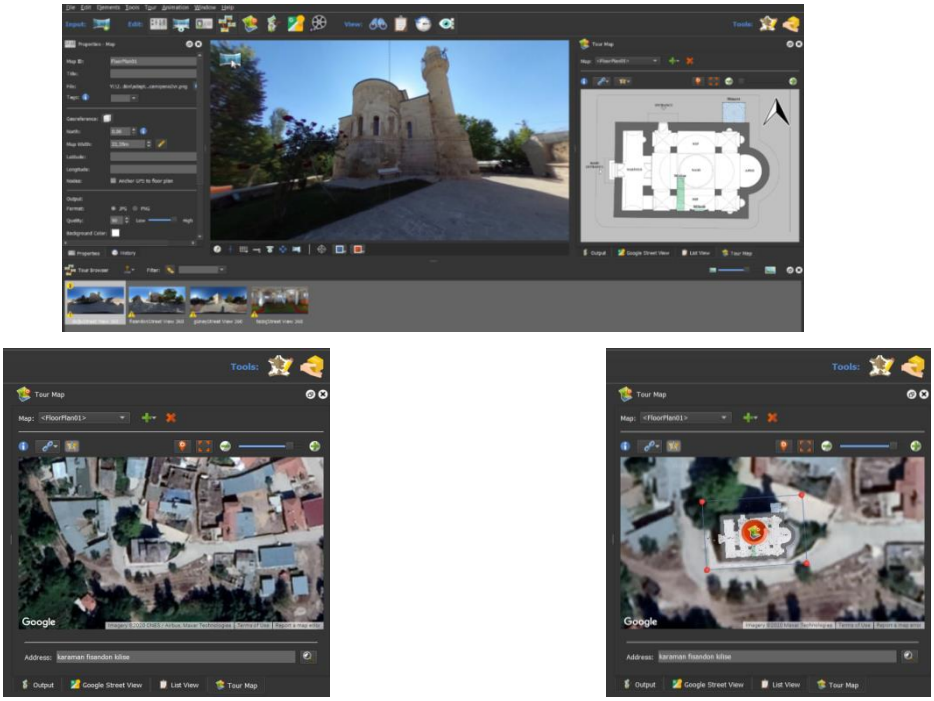

Figure 17. Added Plan and Location of the Building

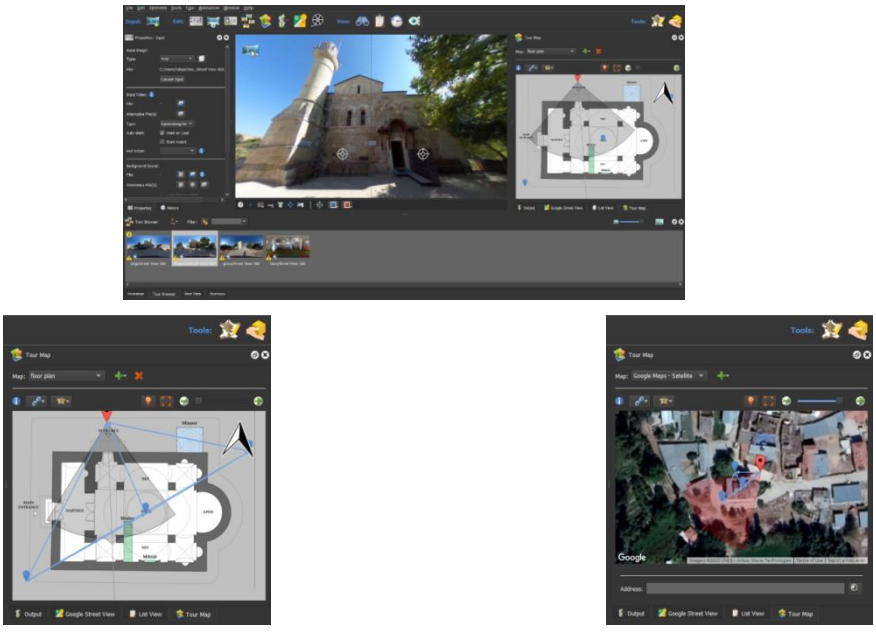

Figure 18. The Route was Determined

The route between the facades and the interior was determined (Figure 18). Text boxes with information about the building have been added to each facade and interior. And then Skin editor components toolbox tan direction, zoom, next / previous, thumbnail menu, auto rotate simplex, commands have been added (Figure 19). The tour was completed with the output command.

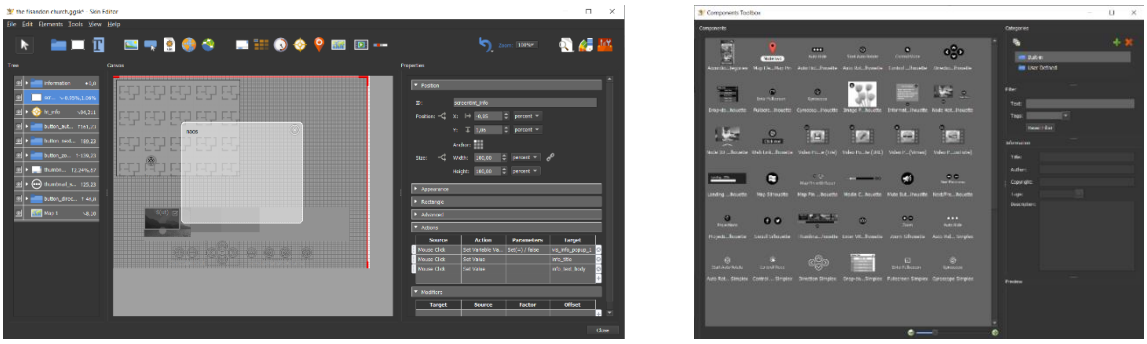

Figure 19. The Text Box and Command Buttons

To enrich the content of the tour, a QR code can be defined, which includes detailed photographs of the building, old photographs and its history. In this QR code, details can be downloaded in formats such as URL, TEXT, PDF, JPG. In this study, URL1, (QR Code Generator, 2020) free site was used to generate QR codes (Figure 21). In order to enrich the content of the tour, a brochure was prepared to contain detailed information about the building, old photographs of the building and architectural features. The details were uploaded in JPG format. The image can be viewed with the help of any smartphone or tablet with a QR code scanning application (Figure 20).

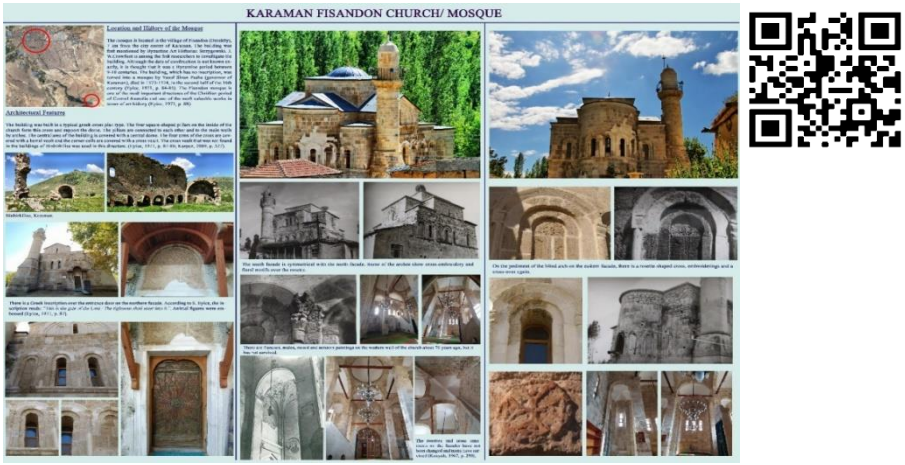

Figure 20. Brochure with QR Code.

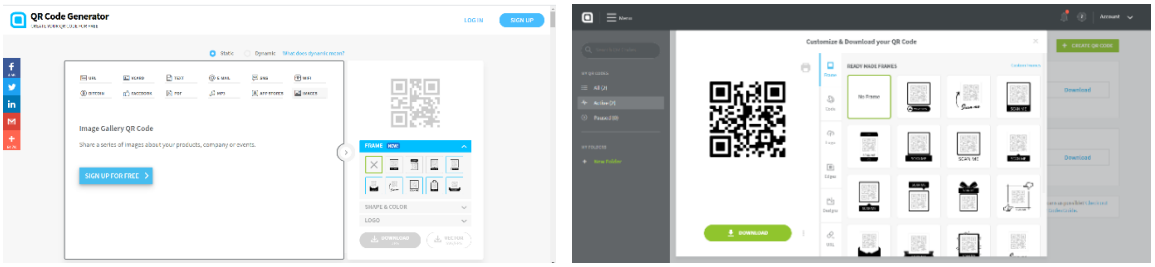

Figure 21. QR Code Generator.

In the virtual tour, the northern front appears first. In the upper left corner of the screen is the plan of the structure. The commands at the bottom of the screen can zoom in and out. You can skip to the next photo or you can turn yourself around automatically with commands (Figure 22). Clicking the buttons on the facades, the information text box is displayed (Figure 23, 24).

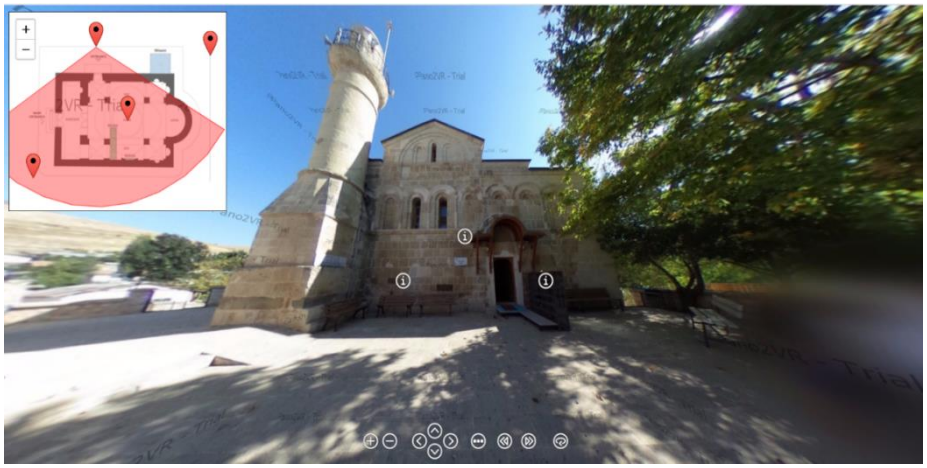

Figure 22. The Commands and The Button.

Figure 23. The Information Text Box.

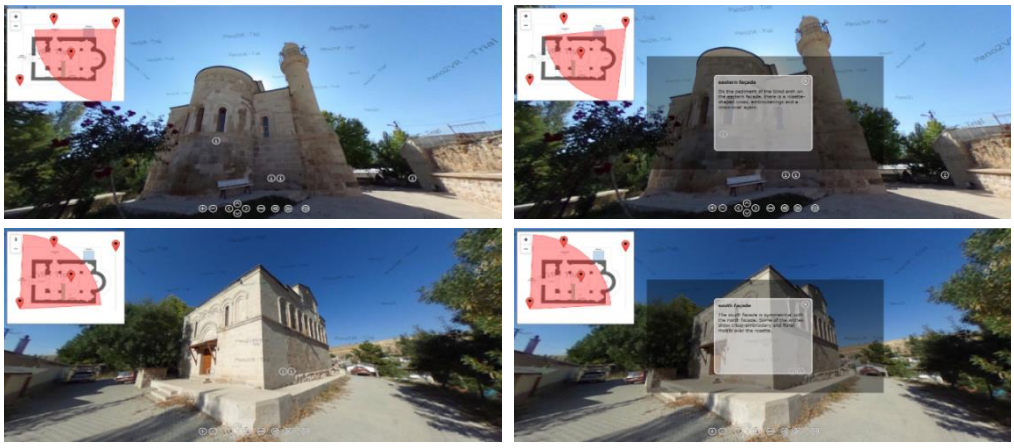

Figure 24. Other Facades of Historical Building.

In the interior, you first see the south wall. Next to the south wall, you can see the mihrab and minber (Figure 25). In the interior, you can easily see the dome, vault, arch details and zoom in (Figure 26). You can reach the photographs of the restorations of the building in the past and the wall paintings that have not survived to the present day, the photographs before the restoration of 1971, with the help of the prepared brochure. This brochure can be accessed from any smartphone application with a QR code.

Figure 25. Naos, Mihrab, Mimbar in Panoromic Tour.

Figure 26. The Dome, Vault, Arch Details.

4. DISCUSSION AND CONCLUSIONS

In this paper, we have presented a basic virtual tour application through a QR code. The application enables virtual visits to cultural heritage. The application is mainly based on Google Street view, Pano2vr application and QR code which had a high degree of accessibility and flexibility. Fisandon Church is one of the important monuments in central Anatolia. This paper aimed to promote this monument.

Along with developing technology, besides the documentation of cultural heritage in 2D, people's access to cultural heritage using technology has undoubtedly contributed to the protection of cultural heritage. Virtual tours are among the most effective technological methods. With the use of some tools like smartphones, virtual tours also appeal to a wide range of audiences such as young people, the elderly, students, and specialists.

With the help of virtual tours, users can enter, explore, learn, search, reach and analyze cultural heritage through the virtual environment with a high level of visual data. Cultural heritage monuments are ideal objects for VR applications due to their importance. Even they are existing or lost, far or close, they have always significant potential for users and governments. The aim of this paper was to create a virtual environment of Fisandon Church to promote the monument as cultural heritage, local tourism and to

raise awareness about the building. In particular, providing remote access via technology for cultural heritage in rural settlements such as the Fisandon Church aims to contribute greatly to the development of rural tourism.

This study contributed to the preservation and promotion of rural cultural heritage for Fisandon church using 360-degree panoramic photographs. Information texts containing basic information about the structure are also included in the virtual tour. Visitors have the opportunity to see the information they have learned theoretically in 3D. This leads to more effective results. In this way, the creation of cultural heritage awareness, especially for young generations, will be more accessible and enjoyable. In the following years, the content of virtual tours prepared in parallel with the development and becoming widespread of technology should be improved and the interest of the visitors should be kept alive with more effective and realistic tours.

REFERENCES

Bruno, F., Bruno, S., De Sensi, G., Luchi, M. L., Mancuso, S. & Muzzupappa, M. (2010). From 3D reconstruction to virtual reality: A complete methodology for digital archaeological exhibition. *Journal of Cultural Heritage*, *11*(1), 42-49.

Eyice, S. (1971). *Karadağ (Binbirkilise) ve Karaman Çevresinde Arkeolojik İncelemeler*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Famukhit, M. L., Yulianto, L., & Maryono, B. E. P. (2013). Interactive application development policy object 3D virtual tour history Pacitan District based multimedia. *IJACSA) International Journal of Advanced Computer Science and Applications*, *4*(3), 15-19.

Karpuz, H. (2009). *Türk Kültür Varlıkları Envanteri: Karaman*. Ankara: Türk Tarih Kurumu Yayınları.

Kersten, T. P. & Lindstaedt, M. (2012, October). Virtual architectural 3d model of the imperial cathedral (kaiserdom) of königslutter, germany through terrestrial laser scanning. In *Euro-Mediterranean Conference* (pp. 201-210). Springer, Berlin, Heidelberg.

Koehl, M., Schneider, A., Fritsch, E., Fritsch, F., Rachedi, A. & Guillemin, S. (2013). Documentatıon of Hıstorıcal Buıldıng Via Virtual Tour: The Complex Building of Baths in Strasbourg. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences,* Volume XL-5/W2

Konyalı, İ. H. (1967). *Abideleri ve Kitabeleri İle Karaman Tarihi: Ermenek ve Mut Abideleri*. İstanbul: Baha Matbaası Yayınları.

Korumaz, A. G., Tucci, G., Korumaz, M., & Bonora, V. (2018). Opportunities of Geometric Documentation of Historic Buildings with Terrestrial Laser Scanner, Examples from Aksaray/Turkey. *ICONARP International Journal of Architecture and Planning*, *6*(2), 246-273.

Lettelier, R. (1999). Virtual reality... A new tool for sustainable tourism and cultural heritage sites management: *Paper presented at CIPA XVII International Symposium* Web, Olinda, Brazil.

London Charter (2006). *The London Charter for the Computer-based Visualisation of Cultural Heritage*. An Online document. Available at: http://www.londoncharter.org.

Maícas, J. M. & Viñals, M. J. (2017). Design of a Virtual Tour for The Enhancement of Llíria's Architectural and Urban Heritage and Its Surroundings. *Virtual Archaeology Review*, 8(17), 42-48.

Martínez-Graña, A. M., Goy, J. L. & Cimarra, C. A. (2013). A virtual tour of geological heritage: Valourising geodiversity using Google Earth and QR code. *Computers & Geosciences*, *61*, 83-93.

Pavlidis, G., Koutsoudis, A., Arnaoutoglou, F., Tsioukas, V., & Chamzas, C. (2007). Methods for 3D digitization of cultural heritage. *Journal of cultural heritage*, *8*(1), 93-98.

Prabawati, T. A., & Triyuliana, A. H. (2006). Multimedia: Making It Work edisi 6. *Yogyakarta: Penerbit ANDI*.

Reffat, R. M., & Nofal, E. M. (2013). Effective communication with cultural heritage using virtual technologies. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *5*, W2.

Sofocleous, E., Ioannides, M., & Ioannidis, C. (2006). The geometric documentation of the asinou church in cyprus. In *Proceedings of the 7th International Symposium on Virtual Reality, Archaeology and Cultural Heritage, Lefkosia Cyprus*.

URL1: https://www.qr-code-generator.com/, Erişim: 05.07.2021

URL2: https://karaman.ktb.gov.tr/TR-144421/karaman-resimleri.html, Erişim: 07.07.2021