

Designing a Mobile Application for Tourism in the Architectural Heritage of Tehran

Sepheri, Yahya ^a
Gholinejad Pirbazari, Alireza ^a

^a Research Institute of Cultural Heritage and Tourism (RICHT),
Tehran, Iran y.sepehri@ut.ac.ir



JOURNAL

ARTICLE INFO

Article history:

Received 23rd June
2021
Accepted 8th October
2021
Published online

Keywords:

Architectural
heritage; mobile
application; Tehran;
tourism.

ABSTRACT

Tehran has many valuable historical buildings as historical and populous capital. However, the increasing growth of the city and the uncontrolled prevalence of construction have endangered the city's architectural heritage in recent years. Introducing architecturally valuable buildings to people, and planning to visit them can reduce the risk of demolition. Recently, mobile applications and social networks have provided new facilities to boost tourism in Tehran following the spread of the Internet and the use of smartphones. The aim of this research is to provide a solution for tourism prosperity in Tehran's architectural heritage. This solution is defined in the form of a smartphone-based application. Users in this app can search the list of Tehran's architectural heritage and start tours to them. The application tries to complete its database of historical buildings and tours in interaction with users and under the supervision of experts. This research includes ideation, preliminary studies, design of the initial model, and proposal of the mechanism and user interface of the above application.

1. INTRODUCTION

Architecture is a manifestation of culture and historical monuments are the most prominent cultural heritage of any city and region. Historic buildings represent the identity of a city and narrate their historical memory. Tehran is the capital of Iran, which is more than two hundred years old. Tehran has gone through various historical periods during these two hundred years, and a different architecture has emerged in the city depending on each period. The architectures of Qajar, the period of transformation, and the first and second Pahlavi period are some of the heritage of historical developments of this city and country (Bani-Masoud, 2009). Tehran has 319 historical monuments that are registered in the list of the Cultural Heritage Organization of Iran. Moreover, the Golestan Palace complex has been registered as a UNESCO World Heritage Site (World Heritage sites, 2018). However, many valuable buildings in Tehran have not been officially registered yet. Surveys show that there are more than 1,500 historic houses in Tehran and only about 37% of them have been renovated (Report on the condition of historical houses in Tehran, 2017). With the increasing growth of the city and the uncontrolled prevalence of construction in recent years,

the city's architectural heritage has been endangered. Identifying architecturally valuable buildings and introducing people to them can reduce the risk of their destruction. The presence of people in these buildings and revival of life in them help to restore the building. The tourism boom is one of the ways to restore these buildings. The city of Tehran has more than 9 million people which is the largest and most populous city in Iran. (Tehran Statistical Yearbook, 2019-2020). Tehran also has the highest number of incoming tourists from other cities in Iran (The survey of national tourism, 2018). This is a good potential for visiting historical buildings.

Today, some of valuable buildings in Tehran have been restored and have found new uses such as museums, restaurants, coffee shops, galleries, residences, etc. In the last ten years, the number of cafes-restaurants in Tehran has increased significantly. Some of these cafes are located in historic houses and their number is increasing. These cafes have been well received by the people. It has created a new wave of café-tourism in Tehran (Abandoned houses change their use optimally, 2020). It has provided a new reason for the restoration of historic houses.

Recently, mobile applications and social networks have provided new facilities to boost tourism in Tehran following the spread of the Internet and the use of smartphones. Statistical data show that there were 88 million active mobile phones in Iran in 2018, and the penetration rate of mobile phones has exceeded 110%. Moreover, every Android user in Iran has an average of 4.2 applications with the theme of travel installed on their mobilephones (The growth of Iran's application industry in 2018, 2019). Therefore, mobile applications have a vast influence in Iran, and designing a tourism application in this region is justifiable and necessary.

The influence of social networks has created public awareness of historic buildings and houses in Tehran. People try to protect valuable historical houses from destruction by identifying, photographing, and sharing them on social media. They also run campaigns to protect historic houses and buildings. Searching for Hashtags (like #tehranhistorichouse, #saveteheran, #tehranoldhouse, etc.) related to the subject of historic buildings and houses in Tehran on social networks shows a large number of posts in this field.¹ But due to the transient nature of social networks, shared information is often forgotten very quickly (Asur et al., 2011). It seems that designing an online platform for reporting and recording Tehran's historic buildings can guide these popular movements.

2. AIM AND OBJECTIVE

Despite a large number of tourism applications in local and international app stores, there is no local application that focuses on tourism and cultural heritage at the same time. In spite of the multiplicity of Tehran's architectural heritage, the search for an application with this theme has no results. An application that specially introduces the architectural heritage

¹ Some NGOs, such as The Committee for Conservation of Historical Houses in Tehran (thhc), have been established by the people to prevent the destruction of the city's architectural heritage. They try to introduce the historic houses to the people and officials and follow up to save and register them.

of Tehran to the people and then plans to visit them has not been designed yet. Active navigator apps in Tehran usually do not differentiate between architectural heritage and ordinary buildings. On the other hand, no application has been created to record and report the valuable buildings of Tehran.

The aim of this research is to provide a solution for tourism prosperity in the architectural heritage of Tehran. This solution is defined in the form of a smartphone-based application. This application displays the list of Tehran's architectural heritage and offers various plans for visiting the buildings by the information received from the context and needs of users. This application tries to link people's daily life and needs with historical monuments.

This application tries to complete its database of historical buildings and tours in interaction with people and under the supervision of experts. This app provides users with forms to register historic buildings (Forgotten houses, newly restored buildings, etc.) in the database. It also provides a tool for users to create architectural heritage tours. Site administrators and hired experts will monitor the accuracy of the information submitted by users. In this way, it will try to provide users with a complete and up-to-date list of the city's historic buildings and sightseeing plans. This research includes preliminary studies, design of the initial model, and proposal of the mechanism and user interface of the above application.

3. DISCUSSION: DESIGNING THE FIRST PROTOTYPE

According to the initial idea of the application, the basic model proposed for the application is a combination of database software (information and search app) and a trip planner (Wörndl & Herzog, 2020). Based on this classification, the first question is how and in what interface information should be provided to users. Considering the previous studies on tourism applications in the world, a successful and practical application should be able to show attractions, points of interest (POIs), and information about them to users, based on a complete and legible map. Buildings with different uses should be shown on the map and, at the same time, be separable for the user. Information and descriptions of places and buildings are complete and classified. The users' location is displayed on the map, and the distance to the places is specified (Garcia-Lopez et al., 2021). Studies say that context in travel and tourism represents the bridge between a specific need and the necessary information to fulfil that requirement. Learning about the environment allows understanding the situation travelers are in and support their decision-making. (Lamsfus et al. 2013) The most important context feature for mobile applications is the location of the user. Outdoor localization mostly relies on Global Positioning System (GPS) (Wörndl & Herzog, 2020). Therefore, a tourism application should use a mobile GPS sensor.

A study on the user interface of tourism applications in Iran shows that searching in app and accurate locating of POIs is crucial for users. Images of monuments and information from other users are also important to them. They want to know about other tourist places close to the same place. They need to know about the amenities of historical buildings and tourist attractions. Other users' scores on historical attractions also influence their decision-making. (Hamidi & Bidi, 2018).

This application will be a local app, so it may be necessary to know the current status of tourism apps in Iran and user comments. To understand the current situation, a number of

active Iranian tourism applications were examined. Three apps were selected that had the most active installs, according to a local App Store.² The structure and features of these applications were reviewed. All of these apps provided users with a list of points of interest (including restaurants, cafes, museums, gardens, etc.). Users can search the database of these applications and find the place they want. Thus, they are all a kind of "information and search" app. For each location, a description is written by the site administrator or site author. There is no difference between a monument (architectural heritage) and a new restaurant in terms of how information is presented. These applications do not have a specific approach to architecture or cultural heritage.

To identify the weaknesses or strengths of these applications from the users' point of view, the comments registered on the download page of these applications (in the local App Store) were reviewed. Having a complete and up-to-date database is one of the most important demands of users. The obsolescence of information in some places has been criticized by users. Technical support is also important for users. Failure to update the software core, slowness or interruption of servers, and Unresponsive customer support, is the most important complaints of users of the applications.

The next question is how the information of this app is collected and how it is kept complete, accurate, and up to date. Studies shows the best information about a city is usually held by locals, or by recent visitors. An application fed and maintained by its users, is a good solution to improve the information contained in mobile applications for tourists. (Fernandes et al., 2013) Engaging users is an important issue in the field of mobile applications. Studies show that user engagement with mobile apps leads to positive marketing outcomes. User engagement leads to greater intention to use, disseminate WOM (Word-of-mouthmarketing) about, and to positively rate. Gamification is a promising avenue for enhancing user engagement (Bitrián et al., 2021). Apps Users showed to be interested in the gaming environment, enabling them to share their knowledge, possibly in a long term basis. (Fernandes et al., 2013) Gamification also had a strong influence on knowledge gain about cultural heritage attractions. Gamified apps convey memorable and real-time information and knowledge to users in cultural heritage sites (Lee, 2019).

Summarizing the above discussions leads us to a basic model. This application is a reference software that guides users to the architectural heritage and plans for them to visit these buildings. The information and plans (tours) are completed and updated in interaction with the users. Utilizing the capabilities of social networks, an interactive user interface based on gamification engages the users with software. All of these features required powerful and efficient technical support. The main theme of the application is architecture and cultural heritage and tourism, and all the components of this model are in the form of this theme. (Figure 1)

² The number of active downloads is based on the statistics of the *Cafe Bazaar* application, the most popular local app store in Iran.

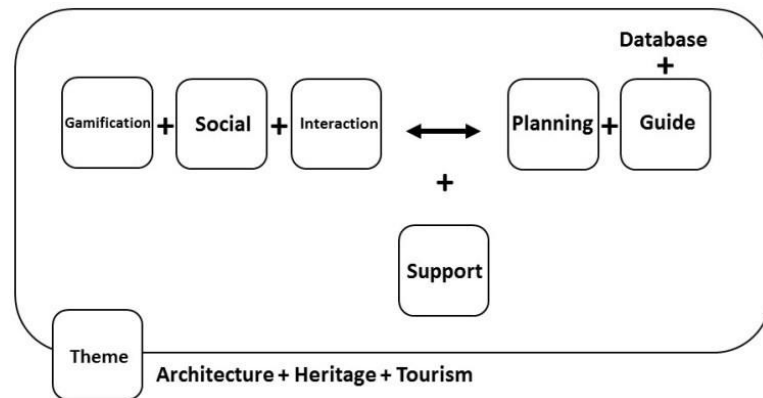


Figure 1. Basic model of the app. Source: own author (2021).

4. USER INTERFACE AND APPLICATION MECHANISM

According to the initial model, the application is divided into three main sections, including a Map, Tours, and Profile. The map is the core of the software and the first component that users see after logging in. The data is presented to the users based on the map. The next part is the tours, in which planning is done to visit architectural heritages. Social networking features (as well as gamification) are provided to users in the profile section. These three parts are related and interact with each other. (Figure 2)

For a better conception of the user interface, the primary form of the application pages was simulated in Figma software. *Figma* is a web-based prototyping tool for mobile applications. The real-time collaboration of the production team in Figma is an important advantage, which can be helpful in the next stages of application design. (Figure 3-5)

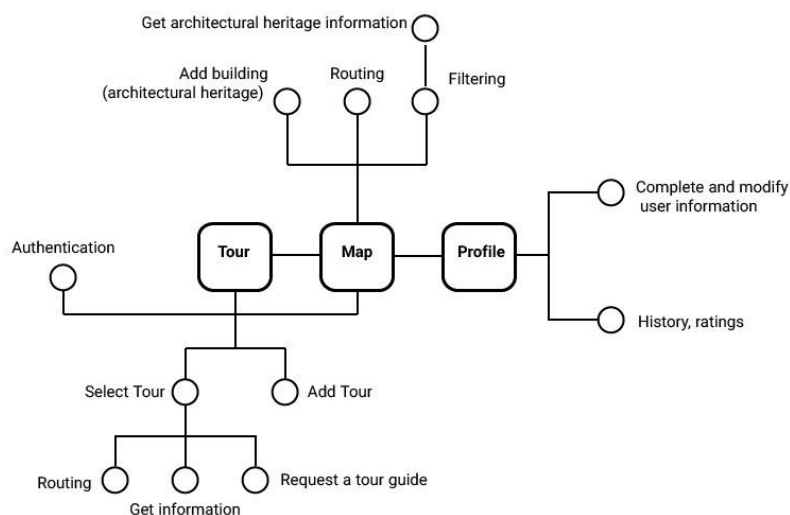


Figure 2. Basic model of user interface. Source: own author (2021).

a. Map

Users see the authentication page for the first time after opening the software on their mobile phones. They can enter the software interface by entering their phone number and receiving the activation code via SMS. The users' account is based on their phone number, and the account data is stored on online servers. Therefore, the account information will not be lost when changing the phone or deleting the software.

Users enter the map section after authentication. The location of buildings (Tehran architectural heritage) is displayed on a map of Tehran in this section. Users can search the map and find the buildings. They can also use GPS and the "Location Service" feature on mobile phones to find their exact location on a map and see the nearest buildings. They can add filters on the map for finding specific kinds of buildings (like restaurants, hotels, etc. or different historical periods) For example, if the coffee shop filter is turned on, only the cafes will be displayed on the map. They can also filter buildings on the map based on their restoration status or historical periods.

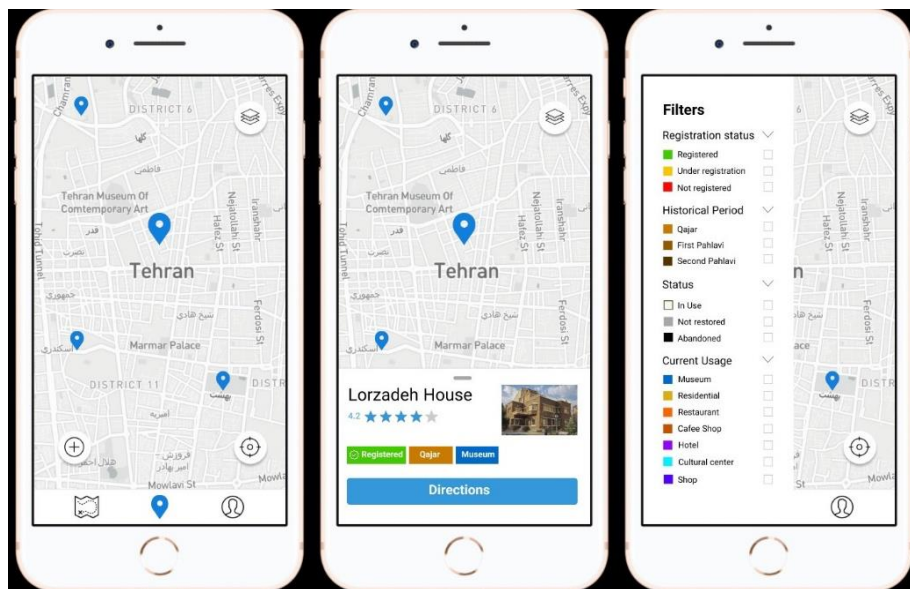


Figure 3. Left: Map interface; Center: After selecting each architectural heritage, its overview information was displayed. After selecting each architectural heritage, its overview information displays; Right: Filters panel; Filters are applied to the map after selection. Source: own author (2021).

A set of information about buildings displays by selecting each building on the map. After selecting a building, a preview of its information is displayed. This information includes the building name, tags, thumbnail image, and navigation button. The tags show the general characteristics of the building, such as age, use, and status of registration in the cultural heritage organization. Tags make it possible to categorize buildings and make them easier to find. The navigation button shows the closest access route to the building based on the user's current location. This feature can also be connected to third-party routing software. A complete profile of the building is shown by opening the information section (pulling up the information box). This information includes the Year of construction, architect, restoration status, current use, and visiting hours of the building. Furthermore, building documents, including pictures, plans, and written documents related to the building, are available in this section. The special feature of this section is that the architectural and

historical data of each building is also provided to the users and the information provided is not only for visits and access ways. Users can suggest completing or modifying any of this information and publish pictures they have taken or documents they have provided. The information registered by users will be published after the approval of the administrators or experts of the app. In this section, visitors can evaluate buildings and rate them from different aspects. For example, whether the building is easy to access and visit or not. In addition, users can submit comments and their experiences about the building in the written form.

Users can add valuable buildings to the application map and register its information. Thus, they click (touch) the add icon in the corner of the map to be directed to the registration form. In the buildings registration form, they must enter a set of information about the building, including name, date, architect, restoration status, current owner, current user, time of visit or activity, etc. They must also state the sources of their information (whether oral or written). After recording the data, the experts check the form and accuracy of the data, and if approved, the data will be published. App experts are people who specialize in architecture and cultural heritage and work with the app on a voluntary or contract basis. Administrators and experts try to review and publish the data submitted by users in the shortest possible time.

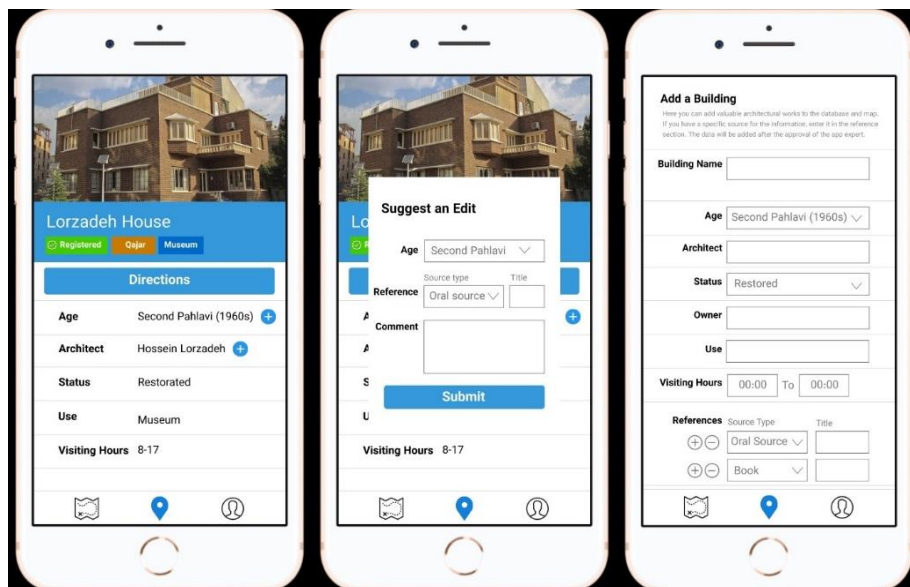


Figure 4. Left: The profile of a building; Center: Edit Suggestion panel; Right: The form of adding building. The data submitted by users will be published after the approval of the administrators or experts. Source: own author (2021).

b. Tours

In the tours section, the application plans to visit buildings (Tehran architectural heritage). Each tour includes information about the time and place to visit the building. Users can see the list of different tours by touching the tour icon and sort tours based on time and place or user ratings. Tours have a variety of topics. Some offer plans to visit the works of a specific architect, and some include buildings from a particular historical period. Some suggestions are occasional, and some others are seasonal. Tours may be half-day or take a full day or two. The information of each tour is displayed by touching the "Start" button. This information includes the list of buildings, visits order, the time of the visits, and the tour routes. Moreover, the comments of other users and their experience of the tours can be seen

in this section. After starting a tour, the application guides users to the buildings and provides them with the necessary information with the help of maps and routing software.

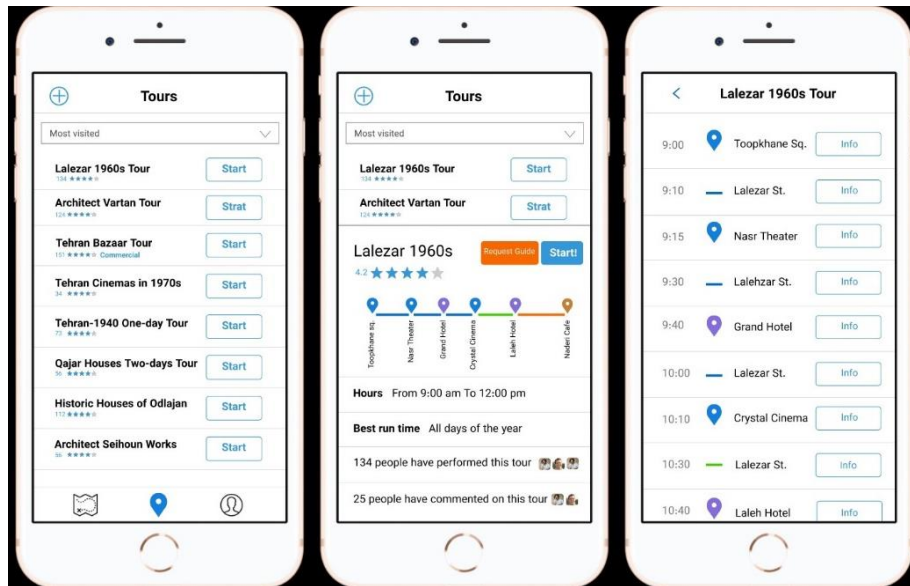


Figure 5: Left: Search and select tours. It is possible to sort the tours based on different items. Users can add new tours by touching the (+) button; Center: Selecting a tour; Right: Details of a tour consisting of places and routes and Specific order. Source: own author (2021).

Users can also request human guidance in addition to machine guidance. This guide can be with them during the tour and guide them about the building. After clicking the Help button, the app will send them a request to the Helpgroups. Guides review user guidance requests, and if accepted, they will be available to guide them at the appropriate time and place. Guides are specialists in cultural heritage, tourism, or architecture. The app works with a collection of tour guides. Specialized and active users can be the guide of the application. The application cooperates with human guides in the form of a commercial contract. Users who request an in-person guide pay a guide fee commensurate with the tour time and expertise.

There are some tours by default in the application that are made by admins and experts. Users can also create a new tour by selecting multiple buildings, determining the route and time of the visit, and sharing it with other users. Other users can comment on the tour and rate it. In addition to usual users, travel agencies and tour companies can also create tours in this application. Users can register and participate in these tours as a group and benefit from the company's services. These tours will be labeled "commercial tours". Users have to pay for these commercial tours. Agencies and companies pay the commission fee of these tours to the application according to the cooperation agreement. This can be a source of revenue and a business plan for the application.

c. User profile

In the profile section, users can introduce themselves to other users or follow them. In this section they can publish their name and picture and a short biography of themselves, but the primary purpose of this section is to share their activities. This application rates users for each activity. Here is where the gamification applied. The app implements Leaderboards, levels, points and achievements badges elements. These are the most widely used game elements in gamification (Hamari et al, 2014). Users receive points for visiting the buildings,

participating in tours, adding comments and rating, as well as reporting the status of the building, and completing and correcting the database. These activities and scores are recorded in the user's profile and they can share them with others. Smart sensors help record scores. For example, when users are present in a place, GPS detects their presence, and points are automatically added to their profile. Table 1 shows an example of scores for different user activities. Scores have different levels. The user will be promoted to a higher level if he reaches a certain score. At higher levels, it can get some non-free features for free (or at a discount). For example, get a business tours for free. All this is to make the user more active in the app and more engaged with the software.

Activity name	Score
Visiting an architectural heritage	10
Submit an architectural heritage (After approval)	20
Attending a tour	15
Designing and submitting a new tour	20
Editing the data of an architectural heritage	5
Writing Comments on places	5
Writing Comments on Tours	5
Rating an architectural heritage	1

Table 1: Suggested scores for user activities in the app. Source: own author (2021).

5. CONCLUSION

The "Tourism in Tehran Architectural Heritage" app was formed on a new idea, based on the potentials and contexts of Tehran city and according to the needs of the people of Tehran. The difference between this application and other tourism apps is that it is specific to the architectural heritage and belongs to Tehran. This will be the first mobile application that focuses directly on Tehran's architectural heritage. Due to a large number of historical buildings in Tehran, this application will play an important role in this field. This application will help the tourism boom and thus preserve the historical buildings by registering, identifying, and directing users to them.

A heritage-tourist application should have a complete and up-to-date database, respond to the needs of the public, use smart sensors and engage the user. Co-creation of information with the help of users is a solution to complete and keep the application database up to date. Based on these ideas and concepts, the primary model of the application was designed. The main sections of the app are map, tours, and profile. Users in this app can search the list of Tehran's architectural heritage and start tours to them. They use the features of the app, under the supervision of experts, to complete the software database. This research included ideation, preliminary studies, modeling, and prototyping of the application. Software programming and coding and working on technical issues are the next stages of the research.

Marketing and introducing the application to locals and tourists will be the future challenges of this app. It is very important to bring together a strong team to run and support the application in the next step. Collaborating with heritage activists, tour guides, travel agencies will be the opportunities ahead of this mobile app and it can help the app get established faster.

REFERENCES

- Abandoned houses change their use optimally: Qajar hangouts in the center of the capital (25 Feb 2020). In *Donya-e-Eqtasad*, No. 4836.
- Asur, S., Huberman, B. A., Szabo, G., & Wang, C. (2011). Trends in social media: Persistence and decay. In Fifth international AAAI conference on weblogs and social media.
- Bani-Masoud, A. (2009). *Contemporary Architecture in Iran*. Tehran: Honar-e Me'mari- ye Qarn.
- Bitrián, P., Buil, I., & Catalán, S. (2021). Enhancing user engagement: The role of gamification in mobile apps. *Journal of Business Research*, 132, 170–185. <https://doi.org/10.1016/j.jbusres.2021.04.028>
- Fernandes, R., Almeida, J., & Rossetti, R. (2013). A Collaborative Tourist System Using Serious Games. *Advances in Intelligent Systems and Computing*. 206. 10.1007/978-3-642-36981-0_67
- Garcia-Lopez, E., Garcia-Cabot, A., de-Marcos, L., & Moreira-Teixeira, A. (2021). "An Experiment to Discover Usability Guidelines for Designing Mobile Tourist Apps", In *Wireless Communications and Mobile Computing*, vol. 2021. <https://doi.org/10.1155/2021/2824632>
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does Gamification Work? A Literature Review of Empirical Studies on Gamification. 47th Hawaii International Conference on System Sciences, 3025-3034.
- Hamidi, S. E., & Bidi, H. (2018) "The analysis of user interface design of Shiraz tourism applications based on user experience". *International conference on web research*.
- Lee, B. C. (2019). The Effect of Gamification on Psychological and Behavioral Outcomes: Implications for Cruise Tourism Destinations. *Sustainability*, 11(11), 3002. MDPI AG. <http://dx.doi.org/10.3390/su11113002>
- Report on the condition of historical houses in Tehran (3 May 2017). In *Hamshahri*, No. 7090. p. 7. <https://hamshahrionline.ir/x58CN>
- Tehran Statistical Yearbook. (2020). Tehran: Information and Communication Technology Organization of Tehran Municipality.
- The growth of Iran's application industry in 2018 (25 May 2019). In *Donya-e-Eqtasad*, No. 4616.
- The survey of national tourism. (2018). Tehran: Statistical Center of Iran.
- World Heritage sites (2018). *A complete guide to 1,073 UNESCO World Heritage sites*. 8th edition. Firefly Books.
- Wörndl W., & Herzog D. (2020). Mobile Applications for e-Tourism. In: Xiang Z., Fuchs M., Gretzel U., Höpken W. (eds) *Handbook of e-Tourism*. Springer, Cham. https://doi.org/10.1007/978-3-030-05324-6_17-1