AGora: An Augmented Reality-based Treasure Hunt Game for discovering the Municipal Market of Chania (Agora), Crete

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Introduction

This paper summarizes an ongoing project that introduces a Serious Game (SG) with Cultural Heritage (CH) interest implemented through Mobile Augmented Reality (MAR). The proposed approach aims to enhance the discovery and understanding of a Cultural Heritage site with illegible architectural and historical value due to current state and human intervention and specifically the Municipal Market of Chania (Agora) of Crete. The system enables the visitor to become a visitor-player of an on-site playful experience and take advantage of the benefits of active learning-through-playing, Augmented Reality (AR) and interactive exploration. The main goal of the study is to enhance the motivation, curiosity, and participation of the visitor in exploring the place, turning the discovery of the Agora into a gamified fun social experience using the cutting-edge AR ability to place and manage synthetic content in real space. The project introduces the idea of a treasure hunt-style SG based on an architectural and historical narrative scenario that is transformed into a game scenario within the digital layer created through the exploitation of Augmented Reality and embedded in the on-site spatial experience.

The Agora and issues raised

The historical building of Agora is situated at the centre of the city of Chania in Crete, Greece. Its location is of great urban importance, because it is in the in-between zone of the old and the new part of the city of Chania. Agora has also a historical importance for the city. Thus, the building of Agora is nowadays a symbol of the city, an architectural attraction and is being incorporated in the everyday life of the citizens as a central market until today. It is a building with a dual role. On the one hand it constitutes a monument. On the other hand, it is the central market of Chania mainly for local products and souvenirs. Despite the architectural and historical value of the site, its morphology, and its inside configuration, confuse the visitors' experience concerning their

comprehension of the dual character of the Agora and their understanding regarding its historical and architectural value (Karagianni, Geropanta and Parthenios, 2020). The building is a cross-shaped symmetrical construction and visitors lack orientation. The interior is full of shops and stalls that have reduced the accessible space as well as the field of unhindered view. Fig. 1 shows the present state of the interior of the Agora, as well as the visitors' indoors experience showing the altered spatial and visual sense because of the store facilities.

Fig. 1 Present experience of the interior of the Agora

The building is a representative example of merging historicity and architectural heritage with the everyday life of the people and the usability of a space. However, this blending is not recognisable. The scale of the building, its architectural value as well as its connection to the urban landscape is illegible. In addition, the lack of orientation, the dense installation of commercial infrastructure as well as the high traffic of the place, prevent the visitor to try to explore it and to discover its cultural value in terms of construction, location and history. It can be stressed that the current condition of the building suppresses the monumental character of the place. Various studies have been conducted and have highlighted the need for innovative solutions that will not disrupt the current character of the building as a market but will also reveal its heritage value. Researchers, using digital tools, evaluated by groups of users, pointed out the importance of technology in enhancing the visitor experience and understanding of the building and its dual character(Karagianni, Geropanta and Parthenios, 2020)(Dania et al, 2021, pp. 263-272).

Scope and methodology

The main motivation for the present study draws on the investigation and the development of an mobile AR-based playful experience that aims to enhance the interest, engagement and motivation of visitors to explore the site and discover its hidden features and to make use of technology to discover the building by themselves during their visit to the Agora. It is known that the integration of game design in non-game tasks, turning them into playful processes, increases the engagement of the user and creates an interesting and fun experience (Susi, Tarja & Johannesson, Mikael & Backlund, 2007). Exploiting serious games in the field of CH can activate the interest to visit and explore the site by triggering the curiosity of the visitor. Augmented reality is a technology that can

bring out illegible or forgotten features of a monument and incorporate them into the on-site real-time environment, composing a complete spatial and temporal experience (Kiourt *et al.*, 2020). Combining Augmented reality with the dynamics of gaming, the place is transformed into an environment of voluntary active experiential learning. While playing, the user turns her/his attention to the game scenario. The experience becomes task-oriented and this can trigger the desired visitor behavior of focusing on the details to complete the task. The clear goals set by the design of a game, as well as the ability to immediate assessment and feedback of the player's actions can lead to instinctive content-learning. To implement the playfulness of the system, a Serious Game in the form of a treasure hunt game was designed. Initially, an architectural and historical analysis of the building was carried out, from which important elements were extracted to compose the scenario of the game. Then, the necessary spatial features and locations were selected to act as clues' locations, with the aim to highlight the coexistence of historicity with the current market state. Utilizing Augmented Reality, synthetic content and information are placed in the augmented space so that the visitor-player serially finds them, following the game scenario. Thus, trying to locate the clues and items, the user alternatively explores the building, and as a result acquires knowledge of it. The game tries to arouse curiosity about the site even for people who would not intend to explore the area or even enter the building. The game can be played individually or/and competitively. Many users can simultaneously try to complete the game using their own mobile device and reach the final game item, the "Treasure" of the game. The main purpose is to find the "Treasure" while the competitiveness is composed of elements such as each player's completion time of the game. Thus, players enter voluntary competition and learn by having fun and playing. Fig. 2 depicts the exploration path, the general location of the clues and the final "Treasure" item of the game which reveals the overall shape and the scale of the whole construction. Fig. 3 presents the basic conceptual structure of the system, showing the three key components that synthesize the implementation. The analysis, the technology, and the conceptuality of the playful experience.
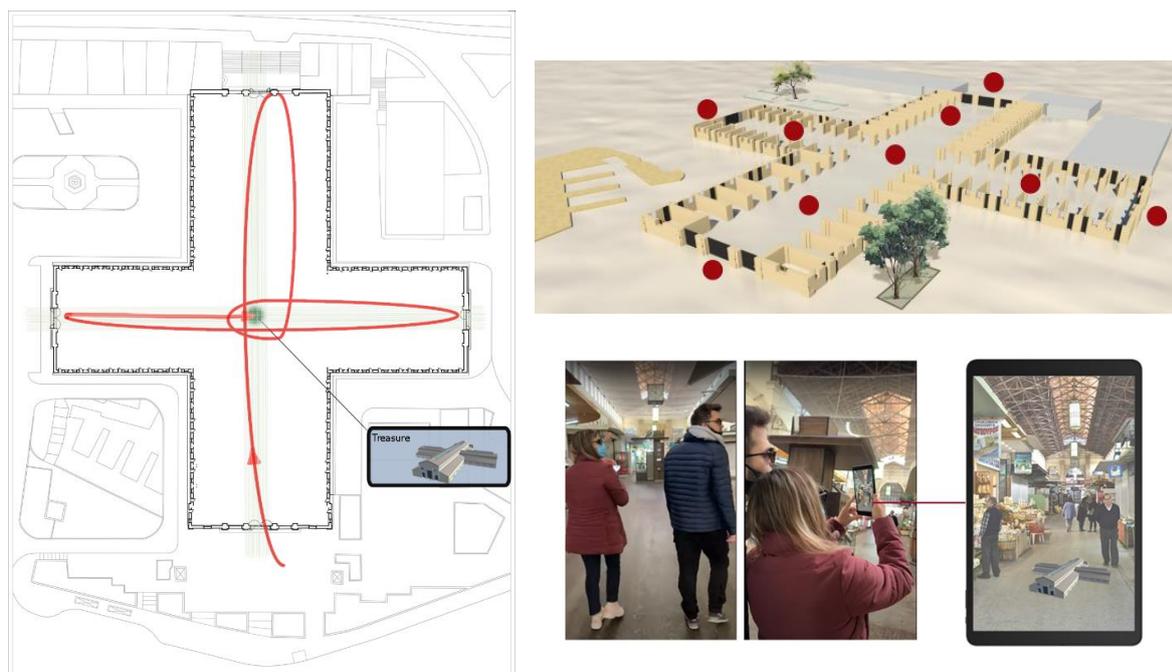

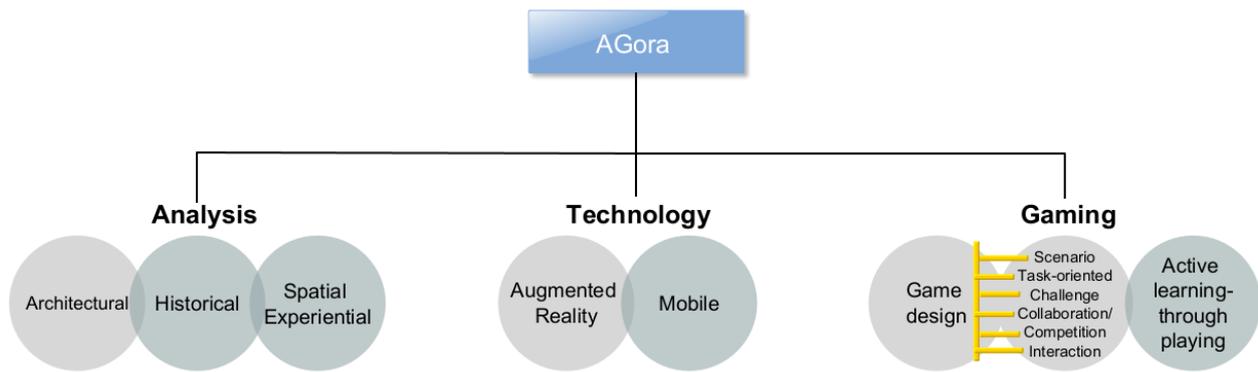*Fig. 2 The path to obtain game clues, their positions, and the game "Treasure" position*

Fig. 3 Basic technical components of the system

The game is aimed at anyone who wants to discover all aspects of the Agora. However, a game that combines AR and is played on-site, is undoubtedly associated with the enhancement of cultural tourism of the monument. Thus, the Agora can act as an attraction for tourists who are interested in an innovative way of contact with the CH site-of-interest. In addition, the game acts as an educational experience that definitely catches the children's attention and thus can activate their interest in exploring and getting to know a place they would not be interested in visiting.

Conclusion

The proposed system is a combination of experience, discovery, and fun. The game is designed based on the real space of a historic building and is played using its real-time spatial features. Therefore, a site with historical and architectural value acquires the character of an interesting game environment. It is important to stress that many games try to simulate reality to bring players into contact with important CH sites by creating synthetic environments. However, the possibility of transferring the concept of a virtuality-based game to the real-world site, enhances the fun and on the other hand expands the concept of acquiring knowledge through the on-site experiential development of conceptual approaches, evaluation and understanding of the place-of-interest. The technology of AR as an experience of merging of the two worlds -the virtual and the real- can bring out illegible knowledge. Combining it with a gaming experience enhances the sense of voluntary visit, engagement, curiosity, participation, and competition. Active participation in an interactive narrative exploration through the completion of goals, increases the interest of the visitor of an on-site experience and turns her/him into an actor of the narration. Thus, through the collection of individual visitor experiences and therefore data, this can contribute to better promotion of the site of interest, attracting more visitors, and consequently even promote smart tourism.

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