



An Innovative Touristic Experience, the ICE Project

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Abstract

There is growing research interest concerning the Museums of the Future, while a plethora of other digital museums are already being established. Most of them aim at rendering visits interactive, yet they still offer a more or less static presentation of the exhibits, thereby making the visitor a mere spectator. The Innovative Cultural Experience (ICE) project has created an advanced platform of augmented representation of exhibits (hyperbox) for the enhancement of the visitor's experience via interaction with the represented material by combining cutting-edge technologies, such as Transparent Window–touch screen, interactive technology, Augmented Reality, monuments-exhibits, and 3D immersive video. ICE offers a unique visit experience, utilizing information based on tangible and intangible cultural heritage. The development of this technology is centered on the cultural heritage of Eastern Macedonia and Thrace focusing on specific cultural monuments of the three religious traditions of the region (Jewish, Christian and Muslim), transforming both tangible and intangible cultural information into a virtual narrative. The aim of this paper is to demonstrate the innovative character of the platform by utilizing only one case study and the fashion by which it is represented by the hyperbox of ICE. The case study concerns the Ottoman bath (hammams) of the area.

Keywords: Augmented Reality; Culture; Tourism; Education; Monuments; Ottoman Hammams; Western Thrace; Eastern Macedonia.

Introduction

Augmented Reality (AR) has been utilized in multiple fields, such as marketing, education, and tourism. The term AR was introduced in 1990 by Thomas Caudell to describe how displays used by electricians are employed to create complicated wiring assemblies (Berryman 2012). In fact, AR is a computer tool that provides an environment of a combined view of the real world with enriched elements, introduced to expand the experience of the user. Therefore, AR is valued as a technological advancement, and it is used as an innovative asset in virtual experience.

The museums have been using AR since 2000 (Marques, Costello 2018) and tourism studies have already recognized the potential of AR technology to render a museum visit playful and exciting via the interactive experience offered by AR (Siang et al. 2019; Zeya et al. 2018). AR offers to the museum visitor the opportunity to understand the importance of each exhibit by providing contextualized information (Weng et al. 2011). Furthermore, there are certain artifacts that cannot be exhibited to the public due to their fragility, whereas others are displaced from their natural environment to be exhibited in museums. AR facilitates the visitor to view such exhibits—and even interact with them—in their natural surroundings (Kyriakou and Hermon 2019). Additionally, AR has been employed to reconstruct destroyed monuments, artifacts, or even extinct species, and present 3D images or animation to exhibit and reanimate, for instance, species or items that no longer exist (Barry et al. 2012).

To present an exhibit with AR, museums often utilize a mobile device; the visitor uses AR embedded in the device's camera to view the exhibits. Some museums also employ a Head Mounted Display (HMD), which projects the exhibits through eyeglasses or a headset. Big corporations like Google, Microsoft, and Metaverse try to upgrade devices, like normal glasses, with all the necessary hardware so the users can view scenes in an improved manner and communicate in real time with others throughout the globe. Although this technology might be applied in everyday life activities, it still has significant disadvantages today, namely, the quality of the imagery or costs associated with it. The use of transparent screens is another means used to present an exhibit through AR, for example, through the use of a commercially available device called HyperBox or Virtual box. This form of display allows the spectator to view objects in a dynamic manner, providing the ability to both inspect the object on the screen and at the same time see through it.

The Innovative Cultural Experience (ICE) project deployed this technology in order to introduce augmented reality features to highlight the Christian post-Byzantine and Muslim Ottoman monuments as well as contemporary ones, alongside traces of Jewish culture in the regions of Eastern Macedonia and Western Thrace of Greece. The ICE team collected primary and original materials which has been recorded and are not restrictive to Hyperbox. The aim of the ICE project is to provide an excellent new commercial tool, which utilizes AR, that can be used in the sectors of culture, education, and tourism—considering that, often, these domains are overlapping due to the nature of tourism and Museum visits. These three pivots were also the priorities of the ICE Project. The material chosen to be displayed on the ICE screen aspires to highlight—and thereby

draw the visitor's attention to—selected cross-cultural and interreligious monuments, themes, and objects, by enriching them with intangible cultural heritage features, such as oral traditions and soundscapes. As a result, the potential visitor of every age group, including minors, will be able to enjoy an augmented cultural experience.

This paper provides an overview of the ICE system, describing the ways the tourist can use it, as well as its practical application in the case study of the Ottoman baths/hammams in the region Western Thrace, Greece.

The ICE System

The Hyperbox is connected to a server. It has small speakers and can display images and videos of the exhibits previously scanned by a 3D scanner and stored in the server. It is compatible with all the popular operating systems, that is, Windows, MacOS, and Android. Moreover, it contains proximity sensors in order to draw the attention of the visitor to a nearby exhibit. These sensors have a sensitivity of twenty centimeters (Serasidis et al. 2022) signal information to the server, and the Hyperbox screen is turned on when a person is at a distance which is defined by the administrator, typically one meter (Kazanidis et al. 2022). They also provide information about the time a visitor spends observing an exhibit, without violating any personal data.

Users can interact with the Hyperbox and provide information about their experience or other remarks, via text or video recording, using an embedded camera that the Hyperbox is equipped with. The material that informs the database of the Hyperbox is classified based on the three sectors of culture, education, and tourism, and all information is accessible in Greek, Turkish, and English.

Additionally, the ICE offers alternative touring scenarios that can be adjusted to the educational background or the interests of the visitors (Kazanidis et al. 2022). For instance, when a primary school has organized a visit to the museum, the content presented in the HyperBox can be adapted to the children's age and interests, emphasizing, for example, the interactive games available in the system. Also, alternative scenarios are available depending on whether the visit is carried out by individuals or groups. Finally, the ICE can be connected to other knowledge management and presentation systems, like XENAGOS, and retrieve additional information. XENAGOS is already operating in some museums, and it is created by the PRISMA company, a partner of the ICE project. XENAGOS is “an innovative knowledge management and content presentation system. Designed especially for museums, cultural sites, cities, and large expos, Xenagos provides an enhanced user experience while collecting valuable user feedback and analytics for later use by the host organization.”

The ICE Project objective was to offer the visitor of the Hyperbox a sense of the multicultural and interreligious history and the present state of the region, without making any judgments or evaluations. This kind of presentation can be useful for the visitor regarding a better understanding of the touristic and cultural value of the area. It is also an educational tool, with its focus on image and sound, presenting the visitor with possibilities for further explorations in a pleasant way. The

Hyperbox user is able to access general as well as specialized information pertaining to the item or monument exhibited.

The researchers collected a large amount of data for the ICE project. This data contains narrations and sound documentation with a focus on cross-cultural and interreligious communities, mainly Jewish, Christians and Muslims and the “Bektashi or Alevi,” a sufi tariqa (order) of Asia Minor that is encountered in Turkey and in Southeast Europe. These narrations concern topics of grassroots religiosity and culture, namely the wrestling celebrations in the region of Evros, site “Hilia,” which take place every summer under the auspices of the Bektashi-Alevi community and their Qurbans, festivals of animals’ sacrifice. The Jewish cemeteries and fragments of their memory through oral testimonies, are also chosen to be presented within the ICE Hyperbox. Finally, the hammams and their connection to the regional history and everyday practice are presented. Additionally, the significant use of water and its meaning in monotheistic religions is discussed.

Subsequently, the exhibits engage in a dialogue with each other in such a way that they can serve as useful educational tools and references for cultural tours that connect the past with the present. The material chosen to be presented in the Hyperbox includes monuments, objects, and thematic units related to the history, culture and religious communities. Objects referring to Jews and the Jewish cultural heritage include: the Torah, kippa and tallit, kiddush cup and Hanukkiah or Salonikia. Objects referring to Christianity, the byzantine and post-byzantine cultural heritage include: the Gospel Book, cross, rosary, icons, chalice, zeon, encolpion, tamata-votives, asterisk, rosary, diskarion, lance and lvida. Objects referring to Islam and the ottoman cultural heritage include: the Qur’an, prayer rug, tasbih, takke, ceramic tiles and Islamic decoration, jugs, wrestling pants, crescent and alems, old books, sings, wooden spoons, and Leclanché cell from the Imaret in Kavala. Thematic units present ottoman mosques, byzantine and post-byzantine churches, minarets, the House of Mohammed Ali and the Imaret of Kavala, Tobacco storehouses in the city of Kavala, the so called “Mecca of Tobacco,” The Roussa’s Teke, Turbes (tombs) and Qurbans in the region of Evros, the Jewish cemeteries in the city of Xanthi and the Holocaust Memorials of Kavala, Xanthi, Komotini and Didimoteiho, and finally the ottoman hammams. In total, twenty-nine objects and ten thematic units are presented. This paper will exclusively focus on the research conducted for the ottoman hammams.

Ottoman Hammams

The region of Eastern Macedonia and Thrace concerns geographical areas with highly visible features of the cross-cultural and interreligious Balkan history. These features are noticeable in the material culture as well as the intangible cultural heritage of the area. The ICE team gathered elements of the intangible cultural heritage, such as narrations, songs, and norms, and provided a mapping of their material manifestations. During the fieldwork, the team aimed at updating the already existing information by adding new data to the existent bibliography and documentation, such as the current condition of the monuments, and discovering new or unknown religious spaces

for which there was no or little information available—especially as far as the ottoman monuments is concerned and the mosques, old and new (Ameen 2019).

The research team first traced the Ottoman hammams of the area that are preserved until today. These hammams are the continuation of the past Roman and Byzantine traditions of the area. In the city of Xanthi, Western Thrace, one can find a late Ottoman mineral bath, still in use, which is located in the area where a Roman Mithraic place of worship is also found. These hammams are used today by numerous people with various religious identities as healing and retreating places.

From an archeological and cultural perspective, there are presented five important Ottoman baths in Eastern Macedonia and Western Thrace. Traveling from Thessaloniki the northeast of Greece the first city one meets is Kavala, where the hammam of the Imaret of Kavala is located. The construction of this hammam was finished in 1813 (Stefanidou 1987, 203-265). Its use was restricted to the students and the personnel of the Imaret during the late ottoman period (Singer 2014, 221-137). This hammam has a central room covered by a dome; in the middle there is a marble plate, while around it are benches and fountains. A small dome is also found at the entrance of the hammam. Now operating as a hotel, the Imaret repaired the hammam by emphasizing the preservation of its initial architectural form. Nowadays, after one hundred years, the hammam is functioning again, open to use by the visitors of the hotel. [Picture 1]

A small hammam is also found on the second floor of Mohammed Ali's house in Kavala, on the Peninsula of Virgin Mary. It is the only private hammam in the city. This Ottoman house was built in the second half of the eighteenth century, and it was the only one that enjoyed a direct connection with the city's aqueduct (Tsigakou 2020). The hammam is small and plain, and it is connected through an opening in the wall with the fireplace of the neighboring room, which was used also as a disrobing space. The visitors used shallow metal bowls—"tasias"—filled with water, and wash themselves. The hammam is not operating nowadays but it can be visited, after preservation works were conducted for the transformation of the house into the Museum of Muhammad Ali. [Picture 2]

The next Ottoman hammam in the region is found in the village Thermes of Xanthi and it is part of the Budala Hotza tekke (Zeginis 1985). The mineral hammam is in direct proximity to the tekke, located by the river. It functions as a space of healing and retreat. It is a stone construction, dating to the late (?) Ottoman period, covered by a dome with miniature windows, while it is supplied with water by the nearby hot spring. This hammam, which is in use until today and can be accessed freely throughout day and night, was chosen to be at the center of the presentation of hammams of the region due to the building's beauty and the natural environment that surrounds it. Moreover, the region has numerous thermal baths and contains traces of Roman culture, as it was a location where Roman troops were stationed. This is apparent in Mithras' place of worship near the Thermes' hammam, where the engraved traces of the representation of Mithra on stone remains up to day (Adrych et als. 2017, 70). [Picture 3a and 3b]

Finally, in the city of Didymoteicho one finds the hammam of Uruc Pasa, which lays in the north riverfront of Erithropotamos River. The hammam was constructed during the fourteenth/fifteenth century. The Uruc Pasa hammam is the most ancient in southeast Europe (Kiel 1981). Furthermore,

it is considered architecturally unique, due to an arch in the disrobing room. If someone were standing under this arch and whispering, the words could be heard and understood by anybody standing at the opposite side of the arch. For that reason, the hammam was known by the name “the Whispering Hammam” (“Fıstıltı Hamamı”). This characteristic made the Uruc Pasa hammam famous all around the Ottoman Empire (Kiel 1981). Nowadays, the hammam is abandoned and thereby not in use. [Picture 4]

The Ahmed Feridun Beg Hammam, built in the sixteenth century, is located on the north side of the central square of Didymoteicho. This hammam “was a work of the best years of the classical Ottoman architecture,” and was a double hammam, containing different bathing spaces for women and men (Kiel 1981). Both spaces were striking, as well as the domes that covered them. In the current moment, and although the monument has been declared under protection following a decision by the Ministry of Culture, the hammam is deserted, unpreserved, and not accessible, as it lays in the back yard of a butcher shop. [Picture 5]

All those five hammams described above are presented via AR in the ICE Hyperbox. The visitor is able to view the content in multimedia form, such as full circle videos and photographs (360 degrees) of the hammams in their natural environment, read descriptive texts, and develop an understanding of their history. Sound recordings allow the visitor to listen to the soundscapes of flowing water that surround the hammams as well as a Pomak song of the region. Moreover, the visitors can interact with the content through the touch screen of the Hyperbox by moving or zooming in or out the features presented, and, as already mentioned, are able to provide feedback of their experience. Finally, the visitors can engage with two games of their choice built around images generated from the depiction of the hammam: “in the first game, users must identify pairs of identical images and in the second game to move image tiles into the right position in order to the final image be revealed” (Kazanidis et al., 2022).

Conclusion

In this work a new management system, the Innovative Cultural Experience system using augmented reality features and aimed to be used in museums is presented. The ICE system offers an AR interactive experience to the visitors of the museum and allows them to choose from alternative tour scenarios that can also be modified by the users. The material represented in multimedia form is accessible in Greek, English, and Turkish. Its interactive nature allows visitors to provide additional elements to the existing information and provide feedback. The ICE is compatible with a group touring experience as well as personalized touring adjusted to the needs of the visitor(s). The platform allows to generate analytical use-based data, namely, statistical data which are related to the traffic of the platform, such as the number of visitors, their preferences on the exhibits, or the time they choose to spend on each of them and the order they view the available information, without violating personal data. All this information is a valuable tool for the administrators of the museums—or, in other words, the digital curators—allowing to generate feedback-based improvements to the exhibition. Therefore, the ICE system will be commercially

exploited in order to provide services to museums, schools, or any other types of organization that need to display items to users providing an AR experience.

Pictures:



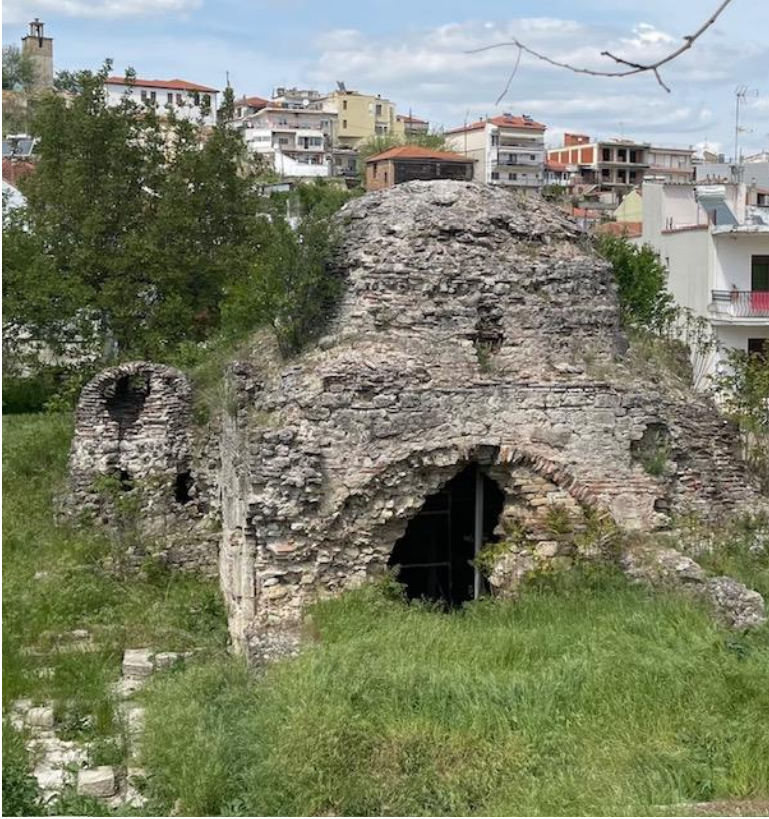
Picture 1: The bathes in Imaret, Eastern Macedonia, Kavala, Greece



Picture 2: The bathes Mohammed's Ali House, Kavala, Greece



Picture 3: The bathes in Thermes, Thermes, Greece



Picture 4: Uruk Pasa Hammam, Didimoteiho, Greece



Picutre 5: Ahmed Feridun Beg Hammam, Thrace, Greece
(Shoots by the ICE team-AUTH-School of Theology)

References

- Ameen, Ahmed. 2019. "The Ottoman architecture in Greece then and now: Quantitative approach." In *Shedet*, 6, 95-115. Faculty of Archeology: Fayum University. <https://doi.org/10.36816/shedet.006.06>.
- Adrych, Ph Philippa, Bracey, Robert, Lenk, Stefanie and Rachel Wood. 2017. *Images of Mithra, Visual conversations in art and archaeology*. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198792536.001.0001>
- Ashraf, Muhammad. 2015. *Importance of Water in the Light of Quran and Sunnah and Ways of its Saving*. Islamabad: Pakistan Council of Research in Water Resources (PCRWR).
- Barry, Ailsa, Graham, Thomas, Debenham, Paul and Trout, Jonathan. 2012. "Augmented Reality in a Public Space: The Natural History Museum." *COMPUTER* 45 (7): 42-47. London. IEEE Computer. <https://doi.org/10.1109/MC.2012.106>
- Berryman, Donna, R. 2012. "Augmented reality: a review." *Medical Reference Services Quarterly*, 31(2): 212-218. <https://doi.org/10.1080/02763869.2012.670604>
- Bruni, Barbara. 2003. La Külliye di Kavála. Storia di un'istituzione". *Quaderni di Semitistica*, Firenze: Dipartimento di Linguistica, Università di Firenze.
- Kazanidis, Ioaannis, Terzopoulos, George, Tsinakos Avgoustos, Georgiou, Despoina and Karampatzakis, Dimitrios. 2022. "Innovative Cultural Experience (ICE), an Augmented Reality system for promoting cultural heritage." In *Proceedings of 26th Pan-Hellenic Conference on Informatics (PCI '22)*, 254-260. Association for Computing Machinery, New York, NY, USA. <https://doi.org/10.1145/3575879.3576001>
- Kiel, Machiel. 1981. "Two Little-known Monuments of Early and Classical Ottoman Architecture in Greek Thrace: Historical and Art-historical Notes on the Hamams of Timurtas Pasazade Oruc; Pasha (1398) and Feridun Ahmed Beg (1571)." *Balkan Studies* 22 (2): 127-146.
- Kyriakou, Panayiotis and Hermon, Sorin. 2019. "Can I touch this? Using Natural Interaction in a Museum Augmented Reality System," *Digital Applications in Archaeology and Cultural Heritage*, Volume 12. Elsevier <https://doi.org/10.1016/j.daach.2018.e00088>.
- Marques, Diana and Robert, Costello. 2018. "Concerns and challenges developing mobile augmented reality experiences for museum exhibitions." *Curator*: 61 (4), 541-558. <https://doi.org/10.1111/cura.12279>
- Sad, Christos, Ziaka Angeliki and Kostas Siozios. 2023. "An IoT System for Innovative Cultural Experience." In *Emerging Tech Conference Edge Intelligence (ETCEI 2023) Thessaloniki October 19-21, 2023*. KEDEA: Aristotle University of Thessaloniki.
- Serasidis, Vasileios, Sofianidis Ioannis, Margaritis George, Sad Christos, Konstantakos Vasileios and Konstantinos Siozios. 2022. "A Low-Cost IoT System for Indoor Positioning Targeting Assistive Environments." In *2022 Panhellenic Conference on Electronics & Telecommunications (PACET)*, Tripolis, Greece. doi: 10.1109/PACET56979.2022.9976353.
- Siang, Tan Gek, Kamarulzaman Bin Ab Aziz, Zauwiyah Binti Ahmad and Syazani Bin Suhaifi. 2019. "Augmented reality mobile application for museum: A technology acceptance study." In *Proceedings of the 2019 6th International Conference on Research and Innovation in Information Systems (ICRIIS)*, IEEE, 1-6. <https://doi.org/10.1109/ICRIIS48246.2019.9073457>
- Singer, Amy. 2014. "The last Imaret? An Imperial Ottoman Firman from 1308/1899." In *The Ottoman Middle East*, edited by Eyal Ginio, and Elie Podeh, 221-237. Leiden: Brill.
- Stefanidou, Emilia. 1985-1986. "The Imaret of Kavala." *Macedonian Chronicles*, 25: 203-265 (in Greek).

Tsigakou, Fani, M. 2020. *A Tour to the House of Muhammad Ali*. Kavala: MOHA Research Centre (in Greek).

Weng, Edmund Ng Giap, Behrang, Parhizkar, Li Ping and Arash Habibi Lashkari. 2011. “Augmented Reality For Museum Artifacts Visualization.” *International Journal of Computer Science and Information Security*, 9 (5): 174-185.

XENAGOS. 2022. *Knowledge Management. What is Xenagos?* Prisma Electronics. Accessed September 23, 2023. www.e-xenagos.gr

Zeginis, Efstratios. 1985. *Bektashism in Western Thrace, a contribution to the history of the spread of Islam in Greece*. Doctoral thesis. School of Theology, Department of Pastoral Studies: AUTH. <https://doi.org/10.12681/eadd/0847>

Zeya He, Laurie Wu and Xiang (Robert) Li. 2018. “When art meets tech: The role of augmented reality in enhancing museum experiences and purchase intentions.” *Tourism Management*, 68: 127-139. <https://doi.org/10.1016/j.tourman.2018.03.003>

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