

Augmented Reality and Storytelling in Heritage

Application in Public Gardens: Caloust Gulbenkian Foundation Garden

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Abstract - Gardens, given its location, history, fauna, flora and environmental scenography, are places that are part of a natural heritage with its own cultural identity. These places are object of preservation, study and dissemination, such as cultural heritage, but in this case with a collection of natural artifacts exhibition alive and dynamic that allows user's natural immersion in the exhibition space. To create a personal user interaction with this natural heritage space is important to capture the story and aesthetics, and find other ways to immerse the user in the space. To that end, this article combines Augmented Reality technologies and concepts of Transmedia Storytelling applied to Gardens as a framework of media-art digital artifact applied to Caloust Gulbenkian Foundation Garden in Lisbon / Portugal.

Index Terms— Cultural Heritage, Natural Heritage, Augmented Reality, Transmedia Storytelling, Digital Media-Art, Museology, Socio-Museology, Garden Design, Landscape.

I. INTRODUCTION

Gardens are an artificial ecosystem, framed in a cultural and aesthetic context [1]. This artificial ecosystem is in fact a creative interpretation of natural landscape, projected to be contained in a specific space. This landscape can be seen in the context of natural and ecological asset as an exceptional place [2]. Gardens are thus places of exceptional cultural identity as landscape designed under a cultural and aesthetic context. The projection corresponds to a natural artifact contained in the cultural identity of the surroundings, arranged as an artifact, but with a nature dynamic life cycle. This artifact is a place with a narrative that allows user immersion and interaction as part of the place disclosure, i.e. the exposed artefact.

The concept of cultural identity is also used in Sociomuseology [3] applied to museums, where it combines archaeology, sociology and museology focusing on the need to strengthen this cultural identity and memory of places. In the case of a Garden this cultural identity and memory of the place in the form of narratives is based on the perception of the setting of the built landscape, fauna, flora and other artifacts placed in the Garden (e.g. sculptures) as part of its aesthetic concept and embedded in the disclosure process. To this end, it's necessary to create a personalized interaction and

immersion in addition to the visit by spacewalk. This process depends not only on passive information (signage with information), but also of active information in the form of entertainment, focused on the aesthetic concept associated with the design and stories, to create user engagement.

Our investigation is based on a research question about the usage of user digital narrative and interaction with cultural and natural heritage, using the concept of Transmedia Storytelling “Fan Fiction” ([4] and [5]). In this article we apply this research using the concepts of Transmedia Storytelling, Augmented Reality technology and forms of digital media-art, as techniques for this purpose, applied to the Caloust Gulbenkian Foundation Garden in Lisbon/Portugal. This article is part of a serie of publications, which began with the presentation of the article “I-Place (Augmented Reality and Transmedia in Museums and Cultural Heritage)” in Artech2015 [6]. This digital media-art artefact is conceptualized for experimentation in various places of cultural and natural heritage, as part of DMAD doctoral research process (Digital Media-Art) at the *Universidade Aberta* and *Universidade do Algarve*, Portugal.

II. AUGMENTED REALITY (AR)

AR allows juxtaposing multimedia content (e.g. 3D models, animation, video, audio, and websites) on a real image captured by a video camera in real-time ([7] and [8]). Its operation depends on an object that can be recognized to trigger an action, usually for presentation of multimedia content. AR is positioned between the real world and virtual world [9]. The difference between augmented reality and virtual reality is that in AR the computer adds information about the image while maintaining the real view of the surroundings captured, while in virtual reality the user is immersed in a world that simulates the real. Currently, mobile computing devices have decreased in size, increased computational and graphical power, and decreased in price, allowing its wide use for AR in terms of access and interactivity [10]. This devices can be complemented by the usage of GPS (Global Positioning System) to align real image, its geographical position and juxtaposed 3D object in outdoor,

or infrared or WPS (Wi-Fi Based Positioning System) in indoor ([10],[11] and [12]).

AR can be seen as a form mediation using interaction and customization that support form of narratives where the user himself can be the narrative creator. This approach increases his empathic and cultural identity relationship reason why we use it in Gardens to trigger images and relate with contents.

III. TRANSMEDIA STORYTELLING

The world today is dominated by the use of Internet communications and devices access to multimedia content, which allow ubiquity, interaction, immersion and randomness (in the sense of customization) as never before possible [5]. However, it is necessary to frame and relate these contents based on same narrative arc but allowing additional collaborative and user-creator narrative using Transmedia Storytelling. Henry Jenkins [4] defines "Transmedia Storytelling" as the art of creating a universe and a process of dispersion of history/fiction in multiple channels, guided by a goal of creating a unique entertainment experience, but coordinated so that each part can contribute to the history. Henry Jenkins also refers to the concept of "Fan Fiction" as the possibility of users to adapt and create their own content, such as stories within the narrative arc of the main story [4].

This focus on narrative and collaboration of users, from a channel or a character is a fundamental aspect to create the dynamics of interactivity and history personalization. Its applicability gains a new dimension when combined with AR, to create personalization, interactivity and virtualization as a means of exploitation of digital narratives, as part of the enjoyment of an artifact, such as a Garden.

IV. GARDENS AS CULTURAL AND NATURAL HERITAGE

The UNESCO Convention for the Protection of Cultural Heritage and Natural World [13] defines natural heritage as natural monuments, geological/physiographical formations, delineated areas of natural habitat, and natural sites or restricted areas, such as works of man and nature with exceptional value from the point of view of science, conservation or natural beauty. These sites of interest are a form of built landscape, where we can include the Gardens. Regardless of the landscape setting, there is a general desire to achieve a "cultural identity" and appreciation of local specificities in safeguarding of natural heritage to draw attention to heritage and exceptional places [2]. Garden is landscape but is also an artificial ecosystem framed in a cultural and aesthetic context [1]. Artificial because is created by man as an environment that is the result of the projection of his abstract ideas about nature.

A Garden evolves according to its life cycle within a cultural and aesthetic context, as an artefact, a kind of nature performance for enjoyment by the users on his immersion in the space, seen as artistic collection. This Garden, seen as artefact, has the history of nature, while fauna, flora and scenery of the area, where there is a life and a dynamic evolution. To understand this cultural identity and memory as a place, we need other forms of enjoyment and capture the narrative, aesthetic and cultural concept in its genesis.

V. RELATED WORK

AR and Transmedia Storytelling have been used with innovation in natural heritage: (i) Mobile APP with AR and Gamification in cases of San Antonio Zoo & Aquarium [14], "Garden by the Bay" in Singapore [15], Kew Gardens in England [16] and the sculpture Garden of Subiaco Park [17]; (ii) Mobile APP with historical and archaeological perspective as the cases of Talking Heritage [18] and the New York Botanic Garden [19]; (iii) Mobile APP with AR and Gaming for Garden maintenance as the case of Seedmat [20], or specific to identify plants from the leaves as the case of LeafSnap and Bioplanet; (iv) Storytelling without RA as the case of Madeira/Portugal Garden [21] that makes visits for capture and share in social network the visit memories in the form of videos, sounds, text, in prose and poetry.

In all above cases we can find the following approaches: (i) AR as mediation using Mobile APP and markers in space to trigger content in the form of images, audio, video and animations; (ii) Gamification usage with AR to increase the interaction and create levels of learning and entertainment; (iii) Usage of narratives of the places, as a reason for themes, content and animations. Given the related work we consider the following challenges to our research: (i) Absence of Transmedia concepts, using characters and parts of narratives, with potential to be adapted and recreated by the user; (ii) Use of markers as plants, leaves and stones with sufficient emphasis to draw attention instead of plates and QRCode with the problem associated natural change these markers over the life cycle of nature; (iii) Environmental context in terms of luminance in markers, which can be supplemented with nearest location by GPS or through a web mapping (WPS).

These challenges and observation of trends have been taken into account in the design of intervention in the Garden of the Calouste Gulbenkian Foundation where there is an ongoing creative process of research in Storytelling and AR. The first phase now completed is based on common AR application Aurasma. The second phase will be based on a new media-art artefact under development called "I-Place" [6]

VI. CALOUSTE GULBENKIAN FOUNDATION GARDEN

The Calouste Gulbenkian Foundation Garden [22] was initially built in the 60s by landscape architects António Viana Barreto and Gonçalo Ribeiro Telles and is a reference to the Portuguese landscape architecture. The Garden is located in a central area of Lisbon/Portugal, having been in the XVIII century one of the city gates. The space has undergone several transformations over time, being a recreation park, a Garden, a zoo, a velodrome/hippodrome and a fair, before the actual Garden. After its completion in 60s as part of the Foundation which has several museum buildings blending into the Garden, the space has undergone an update in 2010 and was also created a Garden Observatory. Currently, the Garden is the subject of several activities like interpretation of fauna and flora and nature photography.

The Garden concept is based on a subtle geometry that provides the user with a set of spaces and ambiances instead of axes, tracks and sites. For the design of these ambiances were considered Portuguese landscape ecology codes that allow

greater familiarity, not only with visitors but also with wildlife it attracts. In this landscape design, several routes were created with names appropriate to the type of fauna and flora that create an ambience in every corner. This is the case of the routes of "Light and Shadow", "Lake Trail", "Journey of the Curbs" and "Course of Smells" around a lake which is seen as an eye of nature in the Garden. The space is shown in Fig. 1.



Fig. 1. Landscape of Gulbenkian Garden

Beyond the Fauna and Flora, there are also a number of sculptures. In Fig. 2, we present some of these references.



Fig. 2. Characters used in the Garden

To design the intervention we considered the concept of digital media-art and arthography as a way of using technology as a means and as a product [23], which enables us to make a reflection on the artefact and concept in the genesis of it, which helps in the construction of the proposed intervention. In the first intervention until March 2015, the following specific objectives were established: (i) RA test, using the Aurasma application in a context of brightness and environmental likely to change image potential to recognize; (ii) Preliminary adequacy of 3D Models content (3D Garden View), Video, websites of an activity (bird of the month) and poetry websites about nature www.citador.pt.

These specific objectives are part of a general objective of this ambience capture phase, concept and model of interaction and stories, refining the "i-place" artifact to compare with AR applications like Aurasma. These objectives were decomposed in design and technical activities considering the following: (i) Association of sculptures with reflection on the nature (poems

and thoughts about nature), signage as a portal to another perspective (3D model of the Garden), placard from one activity to refer to information about it (bird of the month in Website); (ii) Technical tests about objects recognition based on its location to verify the possibility of identifying the objects in brightness and possible deterioration of the test image, or the possibility of recognizing the same image replicated in various parts of the Garden.

Regarding the narrative arc about the garden based on the scenarios and characters we define the following in this phase: (i) Each route will be a kingdom where we choose specific plants to become the kings, nighs, solders and people; (ii) We choose specific poems related to nature to become a kind of voice of garden with people interaction; (iii) The garden become a place where a specific substance exist and are protected by specific role of each kingdom. This substance is fundamental to people the live in Lisbon because is the center of ear and water quality in the city.

Regarding the technical experiments in this phase, using Aurasma with specific channel (Fig. 3), we capture some key images in the garden with his coordenates to test the recognition under several light conditions to interact with contents like website with the poems, garden website, video and garden represented in 3D.

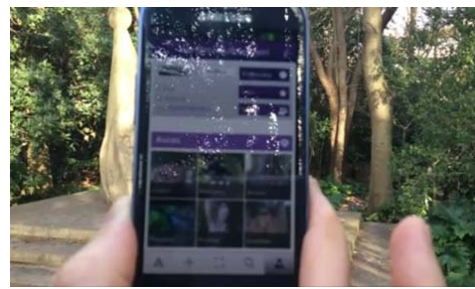


Fig. 3. Gulbenkian Garden channel in Aurasma AR application

To test the signage recognition we associated a Garden 3D model to allow to look from a new perspective into the place as shown in Fig. 4. This approach will allow the user to locate points of interest in 3D or from a map of the Garden and chose is path in the Garden according to his interest.



Fig. 4. 3D Model superimposed in the Garden signage

From a signage of the "bird of the month" we associated a link from the Garden Website which contained information about the bird in question, as shown in Fig. 5.



Fig. 5. Website hyperlink from the activity placard

VII. CONCLUSION

This article combine forms of digital media-art art with concepts of Transmedia Storytelling and AR technology, applied to a Garden as a cultural and natural heritage place of memory and identity. The research is focused on the concept of “Fan Fiction” defined in Transmedia Storytelling to find a way to include user narratives in the general history narrative, using several channels. To illustrate the applicability is presented the ongoing research in Calouste Gulbenkian Foundation Garden in Lisbon/Portugal with preliminary results: (i) Garden history creation using the routes as kingdom’s and the Garden components as characters (fauna, flora) and the theme based on the life cycle of nature; (ii) Technical testing for juxtaposition of content in public space of the Garden, in addition to the poetic associated with the capture of a Garden as a narrative space, passed to digital narrative. It was also tested the possibility of recognizing objects such as posters, nameplates and sculptures in different formats and colour gradations and exposure to different locations light.

As part of the intervention in this first phase to capture the requirements to a new Storytelling and AR artefact called I-Lugar, the second phase will allow to implement the story created and to test a full AR & Transmedia Storytelling platform to compare with basic AR application like Aurasma and test the concept of “Fan Fiction”.

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