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Neoaltar: An interactive multimedia day of the dead experience

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ABSTRACT

Technology has permeated many aspects of human life, from everyday events, entertainment, learning environments, festivities, even solemn ceremonies; such is the case of the century-old Mexican tradition of Day of the Dead. Altars or offerings as they are sometimes called, are a central part of this celebration; whether they are small homemade shrines or big public installations, they are a narrative medium to tell the life-story and honor the memory of a beloved or important individual. This paper presents the creation of a traditional and technologically enhanced offering dubbed Neoaltar, from the identification and classification of narrative elements found in traditional altars, the proposal of an interactive multimedia interface based on a user experience model, and the construction, installation, live demonstration and evaluation of the altar. The exhibition of the offering was done during the most important and publicly open Day of the Dead event in the Mexican city of Juárez; as part of this study a survey was created, and information gathered from 120 users is analyzed and presented. The Neoaltar strives to tell the life story of the departed by introducing a non-linear interactive multimedia narrative while keeping with tradition by using a non-invasive approach to technology inclusion.

1. Introduction

All throughout history, mankind has had the need to tell stories, anthropologists go as far to say that storytelling is central to existence, it's what makes us human (Rose, 2011), Moore states that "telling stories is a universal and fundamental human activity" (2011), one that help us interpret and transfer knowledge.

According to Pimentel "narrativity transcends not only generic and modal boundaries but semiotics, since the narrative can be seen in different mediums and meanings" (1998, 13), she also states that a "story is an abstraction, a construction of reading, such abstraction is capable of being transmitted by other means of representation and meaning" (Pimentel, 1998, 25). These means range from traditional ones such as literature, music, and even the plastic arts, telling stories through paintings or murals. But those are not the only type of works that can tell a story; in fact, any object can transmit a message if it's placed within a certain context, with the intention of telling something and a receiver that can comprehend the message.

Undoubtedly technology has influenced the means to transmit messages, from painting, printing, cinema, radio. The way to tell stories has been changing with the technological advances of the time. Nowadays, digital technology has allowed for the creation of new interactive narratives, where the reader leaves his passive role, to participate in the creation and interpretation of the message.

Books that for centuries maintained their traditional leather-bound paper construction, can now be enjoyed as audio books, where the reader listens to a recording that conveys the story in a linear way, just as it does while reading. Interactive books, on the other hand, allow the user to interact with its content, being able to press a button to activate multimedia feedback or contextual information about the subject at hand. Even though the narrative ceases to be linear, the narrative structure remains the same.

México is known for its rich folklore and traditions, *Día de Muertos* is possibly the best-known example of this; inscribed in the Representative List of the Intangible Cultural Heritage of Humanity by UNESCO in 2008 (UNESCO, 2008), it fuses pre-Columbian Aztec celebrations with the European Christian festivity of All Saints' Day. The celebration starts on November 1 honoring the dead infants and it ends on November 2 with families gathering to remember and welcome the souls of their elder loved ones.

A big part of the tradition is the creation of what is known as altars, these offerings are dedicated to an individual to welcome his or her spirt back to the world of the living; the installations can vary in complexity and are filled with personal objects, favorite food and other elements that help tell their story.

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By the second decade of the 21st century, altars began to incorporate technology, using light, screens or projectors and sound effects to convey the story of the departed; this is especially true on display altars and not so much on personal home offerings.

Considering that messages can be transmitted by different means, this paper presents the integration of interactive multimedia technology in a Day of the Dead offering, to narrate the story of the deceased. A traditional offering is already considered a communicative product that it can be separated into two parts, elements that have a symbology based on indigenous and Catholic tradition and personal objects that convey a message about the deceased (Rodríguez et al., 2012).

The Neoaltar, as the authors call this new technological offering is presented as a novel way to tell the story of the departed and honor his life; creating an interactive multimedia narrative experience whilst keeping with tradition.

The rest of the paper is organized as follows. Section 2 covers the literature review as well as the related works. In Section 3, details the design and creation process of the Neoaltar. Section 4 presents an evaluation process as well as the survey used to assess the Neoaltar in a real-world scenario. The results obtained after applying the instrument are shown in Section 5. Finally, a conclusion is presented in Section 6.

2. Related works

There are documented cases that deal with the use of technology in a Day of the Dead altar, such as in the Mexican state of Queretaro where sequentially lighted boxes would guide visitors from one altar to the other, mimicking the path the soul of the departed would follow; video projection was also used to present animations at the altar entrance (Primo et al., 2015).

In the city of Guanajuato, a fusion between Japanese and Mexican traditional altars took place, giving birth to a collective installation called *Encuentros-Reencuentros*, "an exhibition that allows the conception of a space between the similarity and the difference of two traditions connected by the same motive: death" (ChaMeshiJi, 2014). According to the authors, their intention was to give a new meaning to the traditional altar and to revitalize the bond with their dead relatives and loved ones, using everyday life elements.

The installation included projection surfaces made out of rice wafers, noodles and sweets that interact with lights and video projections to "produce atmospheres and propitiate immersive experiences that guide the viewer through an apparently known world, but that lead the spectator to face surprising and unexpected situations" (ChaMeshiJi, 2014), audiences were also encouraged to place food offerings at the altar.

As part of the six-project initiative *Ciudad Intervenida* sponsored by the local government and following the same motif of celebrating death, Mexican animation studio Llamarada produced Santolo (2012), a video mapping exhibition at Dolores cemetery, the largest burial ground in Mexico City. Video of folklore characters such as *alebrijes* and *naguales* performing dances along with simulated fireworks were projected on real tombstones and trees.

In San Francisco, California Howie Katz created the Altar Ego, according to the author "the installation is an interactive computer-driven altar in which the viewer himself becomes the person being memorialized" (2012), the computer asks the user to sign in to their Facebook account and based on the information that it can gather from the social media profile as well as querying different services, it composes a webpage that is used to project photos, videos, favorite books, movies, and other personal preferences onto blank objects on the altar.

The Altar Ego project is a good example of one of the application domains where techniques for summarization and storytelling could be used, according to Rudinac et al. (2018) one can:

> Support event-based creation of videos from pictures and video clips recorded on smart phones. To this end, they would automatically organize and structure such user-generated multimedia content, possibly in low quality, and subsequently determine the most interesting and suited parts in order to tell the story of a particular event (p.638).

In the article from Amato, Castiglione, Moscato, Picariello and Sperlì, the authors propose "a novel multimedia summarization technique from Online Social Networks… using an hypergraph based approach and exploit influence analysis methodologies to determine the most important multimedia objects with respect to one or more topics of interest." (2018a,b).

They describe a six-step process for summarization that allows them to "determine a small set of multimedia objects (i.e. images, video, texts, audios, etc.) that are relevant with respect to one or more user-defined keywords and present characteristics of continuity and variety and not repetitiveness." (Amato et al. 2018a,b), this leads to the creation of a multimedia story in accordance with predefined constraints.

The summarization process and algorithm presented by Amato et al. 2018a,b poses an opportunity to create personalized altars based on information that gets automatically gather, following certain constraints, either from social media profiles or real-time user-generated data.

Other works include mobile applications, games, interactive books, and educational applications, where the user can tap on objects in the altar and description and the meaning of each item is displayed; in these cases, technology takes over and the essence of the traditional altar is not present, since all physical elements are eliminated and replaced by graphics on a screen.

After going through the literature and comparing similar technological altar installations, it was found that technology is mostly used as a novelty; this paper focuses on using discreet interactive multimedia interface to tell the story of the departed, without drastically changing or interfering with the traditional elements of the altar.

3. The Neoaltar

The first stage towards building the altar consisted in gathering information regarding narrative, interactivity and traditional Day of the Dead altars; the second step was to identify narrative elements present in the altar in order to classify them in a similar manner as Propp (1998) did with his Morphology of the Folktale book; the last step consisted in building the interactive installation with the appropriate technologies to convey the message guided by Garrett (2010) user experience methodology.

3.1. Narrative

Although usually associated with literature, narrative can be found in other mediums as well, Rincón states that "the narration is a process by which an audiovisual work suggests to a spectator the steps that lead him to complete a story, to understand what is told" (2006, 23:97).

According to Pimentel a "story is an abstraction, a construction of reading" (1998) and expanding on the definition of reading as understanding the meaning of any graphical representation, then narrative can be applied to any medium that can be read; as would be the case of an altar, where objects are used to the tell the life story, achievements or anything else about the person honored in the altar the author wishes to tell.

Pimentel also states that the story is "the progressive construction, through the mediation of a narrator, of a world of human action and interaction, whose referent can be real or fictional" (1998, 10), in the case of the Neoaltar, this construction does not mean just the physical structure, but the act of carefully selecting elements such as images, food, clothing or any other object that the author wishes to use in order to convey the message and interact with the spectator.

Another important aspect mentioned by Pimentel in her work is how the narrative develops within a universe determined by the author called the diegetic world, a reality where the characters, places, and objects act, creating a reality that is only possible in that world. This world created by

history is only an abstraction, which will acquire meaning and sequence when the reader or spectator interprets the work and combines all the elements that the author exposes in the story (1998, 10–11).

3.2. Elements of the altar and their classification

An altar is not merely a collection of random objects placed on any support structure; it is an expression of the vision that an entire country has about death, is an elaborate piece that is central to the celebration. It is a common belief that the spirit of the departed can return from the world of the dead and reunite with loved ones who yearn their presence, and thus the altar is built in such manner to make them feel welcome and honor their memory.

According to Rodríguez, Hermida, and Huesca "the altar is placed in a room, on a table or shelf whose levels represent the strata of existence" (2012). Commonly, altars tend to have two or three levels, the former representing heaven and earth and, in the latter, including the intermediate level of purgatory. The more traditional altars have seven levels that represent the journey souls must endure to reach heaven, and each step has a different meaning.

Aside from the predefined physical constitution of the altar, there are rules that must be followed about the items and offerings that are included and where they are to be placed. Following what Propp (1998) did with his study about popular Russian folktales, the authors of this paper examined 24 traditional altars in three different publicly open exhibitions held at schools during the Day of the Dead celebration in 2016, in the Mexican town of Ciudad Juárez.

After analyzing the data, it was found that a picture, name tag, object of profession, clothing, beverages, personal accessory, bio/memoir, set design, sound/music, food, and personal quotes were always included as part of the installation, these 11 elements are what the authors refer to as main narrative functions of the altar. These items communicate a specific message and combined with the other functions, make for the narrative structure that is offered to the spectator for its interpretation.

3.3. The installation

With the narrative functions identified, the last step consisted of building the altar installation; this included planning, experimentation, and final assembly.

For the planning stage, Garrett (2010) user experience model was adopted, he states that user experience is not about the internal working of the product, it is about how it is used, how it comes into contact with the user. Designing a product having the user experience as the main goal, goes beyond function and aesthetic, it must meet all the needs of the user and pose no difficulties when using the product or service; it is important to note that user experience should not be confused with the user interface or even with usability.

Garrett's model is based on five interdependent planes (strategy, scope, structure, skeleton, and surface), Table 1 shows each of these levels and how it was applied in the project.

Alongside the planning for each of the levels, the authors experimented with different mediums and technologies to achieve the desired effect.

For the strategy plane, a short but insightful survey was conducted at Juárez Autonomous University in order to help define what the users' needs were when it came to an altar installation. The results showed that they expect the altar to honor and, in some way, tell the life-story of the deceased as well as promote Mexican traditions.

Scope level describes how the needs of the product and the user, proposed in the strategy plane are met. To achieve this, the needs must be translated to specific requirements, this means, what content and functionality the product will offer the user, the specific requirements will be a more concrete guide of what steps must be done to achieve the goal. As stated in Table 1, this was done through a content sheet that described the relationship between items in the altar and the narrative functions.

Once the goals were clear and prioritized, interaction design and information architecture were developed in the structure plane. Figure 1 shows the system interaction pattern, which describes how the users may interact with the altar.

Information architecture deals with information analysis, classification, categorization and hierarchical representation of the data that is presented to the user (Toms, 2002; Ruzza et al., 2017). In the case of the Neoaltar, the information corresponds to the narrative functions and their multimedia content, Figure 2 shows the seven devised categories in a one-level hierarchy.

In the skeleton stage, the physical distribution of the structure plane is defined. Following the standard three-level altar, a layout for the sensors, screens, projector, lights, along with any other element that's part of the altar or that will drive the interface, was created.

Only the first level of the altar harbors the user interface, it is within the spectator's reach and holds the seven touch sensors that represent each narrative function. As seen in Figure 3, the distribution of the sensors makes it so, that the user can reach and activate a maximum of three sensors at a time.

The second level is mostly ornamental, it includes LED strips that light up when a touch sensor is activated, the light line connects the sensor with the projection area, which is on the third level. The information is distributed in the projection area, this allows for multiple multimedia contents to be shown at the same time.

The projection area in the third level has seven subareas, which are assigned to each category. As seen in Figure 4a, the content shown for every function will be different, since they represent a different narrative element; however, if the user activates two sensors at the same time and their subareas are side by side as depicted in Figure 4b, the system will combine the two narrative functions into a new multimedia content, these combinations are what make the narrative experience non-linear and different for every single user.

The last level of the user experience model is the surface plane, where functionality and aesthetics meet, it deals with sensory design or how the product will look like, the controls and the visual cues that will help users interact with it. The Neoaltar aims to create an immersive multisensory

Table 1. -Garrett's Interaction model applied to the Neoaltar.

Garrett's model elements	Neoaltar implementation
Strategy	Integration of multimedia interactive technology to the narrative structure of an altar to tell the story of the departed, without losing its value and essence. Users want to honor their departed, preserve Day of the Dead tradition and understand the narrative of the altar.
Scope	A content sheet that describes how the narrative functions will be presented and their relationship to physical elements in the altar, as well as their behavior.
Structure	Definition of how the user is going to interact with the product, the actions that can be performed and the sequence needed to reach a specific content.
Skeleton	Physical distribution of the altar, sensor location, light and projection surface position. Since the altar is a single interface it does not require a navigational design.
Surface	Using different capacitive sensors carefully concealed as part of the elements of the altar that represent the narrative functions, hidden speakers and video projectors as well as traditional flowers, food and copal to create the desired atmosphere and stimulate the senses.

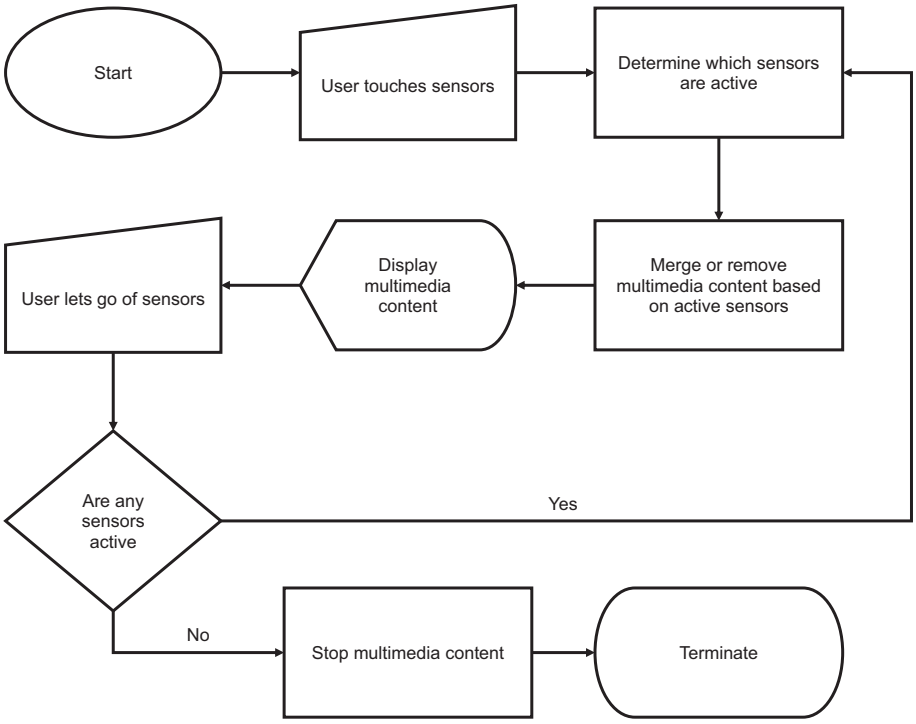

Figure 1. System interaction pattern.

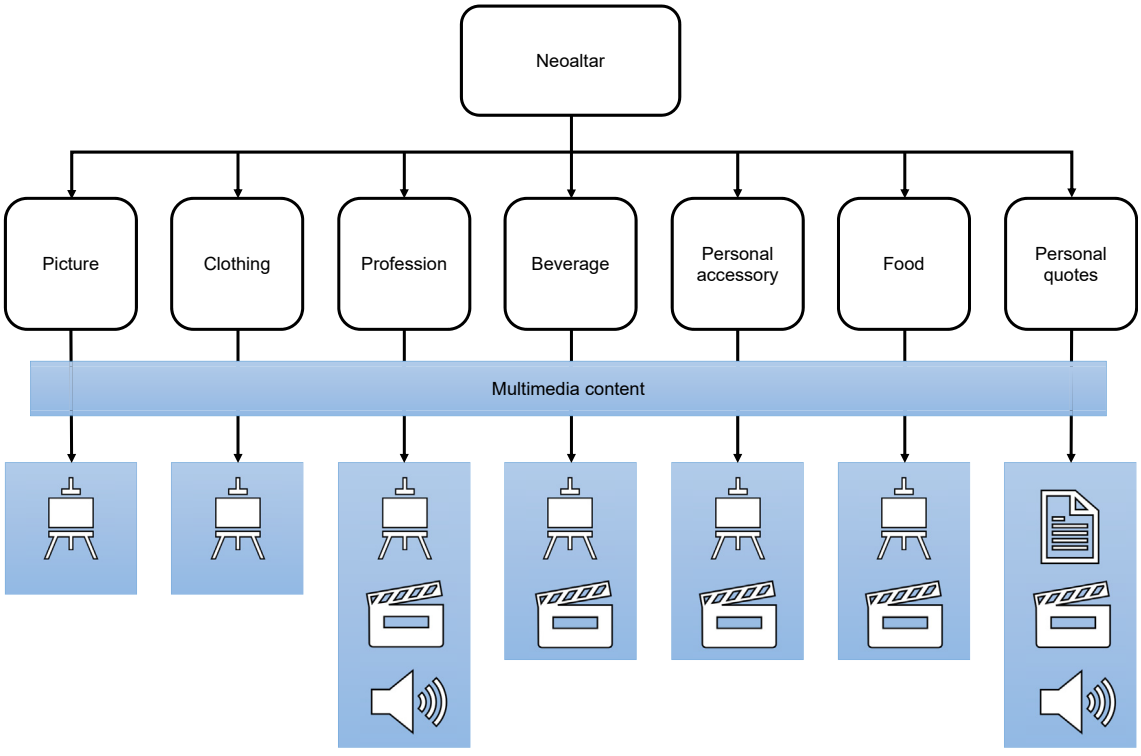

Figure 2. Neoaltar information architecture categories.

experience by combining capacitive sensors, audiovisual elements, lighting effects, and aromas whilst maintaining the value and essence of the altar.

In this sense, the installation only included objects that one would usually find in an altar. The items were retrofitted with different conductive elements in order to make them work with the Adafruit sensor controller breakout card (Adafruit, 2018) driven by an Arduino microcontroller (Arduino, 2018); when the user touches with any of the objects, its capacitance changes thus notifying that the sensor was activated.

To help spectators identify the items that they can interact with, each one was placed on a piece of laser-cut MDF (Medium Density Fiberboard)

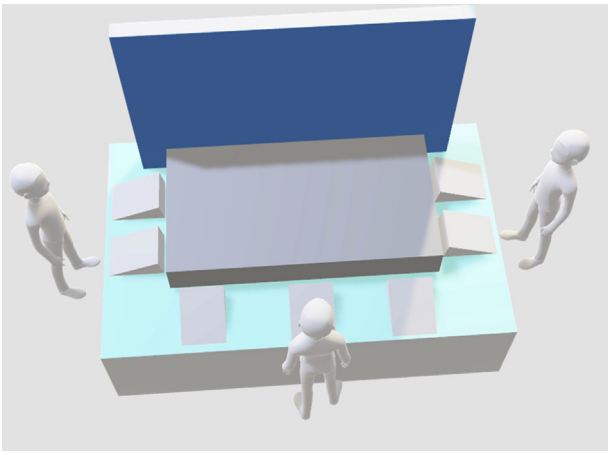

Figure 3. Neoaltar skeleton.

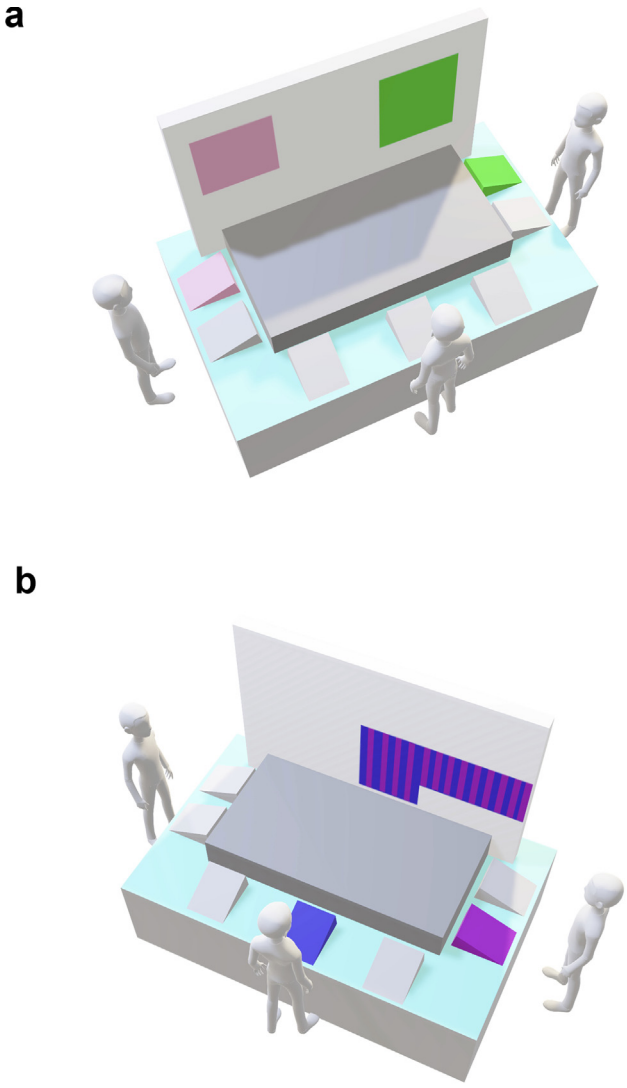

Figure 4. User interaction a) Unrelated sensors activated independently b) Related sensors activated simultaneously.

that resembles the ornamental sheets of perforated paper found throughout the festivity. Figure 5 shows how the board glows when the user touches the item, the color of the light is also a visual cue for the multimedia content that will be displayed.

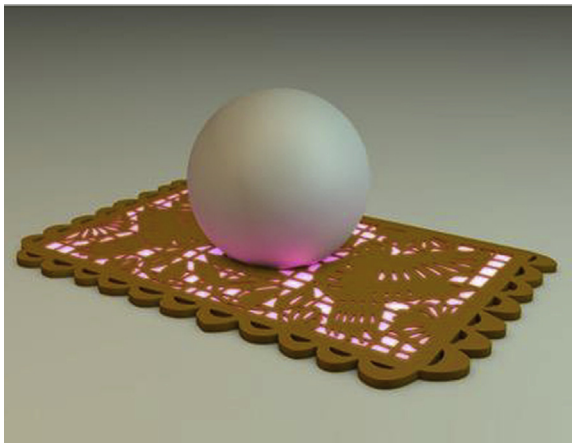

Figure 5. Sensor placed on top of a glowing MDF base.

With every level of the experience model covered, the backend of the system that is responsible for responding to user interaction was created. For this task, and after searching and evaluating different developing environments, vvvv toolkit was selected, who according to their creators "is a hybrid visual/textual live-programming environment for easy prototyping and development. It is designed to facilitate the handling of large media environments with physical interfaces…" (vvvv group 2018) thus making it a good fit for the needs.

The toolkit is responsible for managing the information that is shown to the spectator, each touch sensor is assigned a different content which is displayed in different areas of the screen, this allows the user to identify what multimedia content corresponds to the element that is touching, to further enforce the effect, a LED strip lights up and connects the item to the display area and a border that matches the color of the light surrounds the content.

3.4. Live exhibit

The final step in the whole process was to test out the installation, this was done as a live exhibit on November 2nd, 2017 during the 35th *Altares y Tumbas* event that is organized annually by Juárez Autonomous University, it is the largest and most important Day of the Dead celebration in Ciudad Juárez, with over 10,000 attendees (UACJ, 2018).

During the celebration, traditional altars dedicated to prominent, famous or otherwise important people are built by students; the Neoaltar was used to showcase and honor late Mexican artist Frida Kahlo de Rivera. Although it might seem predictable choosing such iconic character, the authors decided on her, because while being a well-known personality among all age groups, there are a lot of misconceptions and unknown facts about her life and people just seem not to care about it.

Figure 6a illustrates the conceptual rendering of the altar, Figure 6b the distribution of the elements, Figure 6c the imagotype that was created as part of the project identity, while Figure 6d shows the actual installation.

4. Survey and evaluation

As part of the interactive exhibition, attendees to the event that visited the altar were asked to evaluate the overall experience through a survey. Approved by the Institutional Committee of Ethics and Bioethics and following their guidelines, participants were informed of the purpose of the research and their right to withdraw at any moment without any reprisal. Informed consent was obtained from every participant.

Upon entering the exhibition room users were encouraged to approach and touch parts of the offering, as it can be seen in Figure 7; this was somewhat unusual for most people since that is not something that is permitted in traditional altars.

Figure 6. a) Conceptual rendering b) Element distribution rendering c) Project imagotype d) Actual installation.

Figure 7. Users interacting with the Neoaltar.

Since the event is open to all public, participants come from all age, socioeconomic and education groups. Only a fraction of the event attendants had the opportunity to interact with the Neoaltar, as there are many activities taking place at the same time, a total of 120 usable surveys were collected. Users were informed of the purpose of the research and consent was obtained from each one.

5. Results

This section presents and describes the findings of the live exhibit and the information gathered through the survey. The Neoaltar survey (see supplementary material) consisted of 11 items divided into four categories, each one providing insight into different aspects of the altar.

The questionnaire was created by the authors mostly to evaluate if the Neoaltar kept with tradition whilst providing a different way to live the experience, and most importantly, if the narrative was not compromised by the inclusion of technology and thus transgressing the message and value of the offering; because of this, the questions are no based of any usability or technology acceptance model survey, although the application of such study is not discarded in a future iteration of the altar.

Due to the heterogeneous nature of the population that attends this event is, the authors decided to only use age as the segmentation factor, thus only one question of the survey is related to user information. The second category of items relates to the narrative aspect of the altar, whereas the third one, focuses on tradition. The last set of questions is meant to evaluate the use of technology and overall presentation.

From the total sample size N = 120, the group with the highest representation was that of 19–25 years with 30% (n = 36), followed by 26–35 years (n = 34), then the segment from 13 to 18 years made up 13.3% (n = 16), followed by both 35 to 45 and 46 to 55 groups with 10.8% each (n = 13), and finally both the youngest and oldest groups 12 or less and 56 or more had the lowest representation with only 3.3% each (n = 4).

Regarding whether they consider any altar conveys a story or tells anecdotes about the departed, 116 individuals agreed it did, whereas 4 replied that they did not know. Concerning how many stories they could distinguish in the Neoaltar, 105 users responded that two or more, 14 said that only one and only 1 person replied that none.

Question four asked if the technological or traditional altar offered more information about the life of Frida Kahlo, 52 agreed on the first, 16 believe that the latter and another 52 said both did the same job. Similarly, when enquired about which type of altar, they considered better tell anecdotes about the departed, 64 answered that the Neoaltar, 22 the traditional, and 34 believe they do it equally.

The third section of the survey deals with tradition, when asked if the Neoaltar included the same elements as a traditional altar, 109 said it did, and 11 responded that it did not. On whether it was missing any items otherwise found in conventional offerings, 38 users replied that it was, while 83 did not find anything absent. The last question in this set was if the technological altar preserved the Day of the Dead tradition, 86 people believe so, 31 said that somewhat did, 1 reported that it did not, and 2 stated that they did not know.

For the last section, overall impressions and use of technology were evaluated; question nine yielded that 65.8% of the users preferred the technological altar, and 34.2% the traditional one. Question ten, had the user rate on a scale from one (being the lowest) to ten (being the highest) the integration of technology in the offering, over 97% of the users gave it a grade of seven or better, while only 3% six or lower. The final question asked the users if they knew any other technological proposal applied to Mexican traditions, 80.8% responded that they did not, whereas 19.2% said they have seen them in museums, video games and on the Internet.

6. Conclusion

This paper presented a technological approach to traditional Day of the Dead altars, these offerings are an essential part of the Mexican celebration, they are not just a sight to behold; is a broad experience that combines narrative, tradition, mysticism and the longing for the late loved ones, an opportunity to honor them and keep their memory alive.

Being such a central part of the festivity, the matter had to be approached sensibly; the idea was not to turn the altar into a museum's exhibition piece, stripping it from its essence to include technology for the sake of novelty. The Neoaltar goal was to help tell the departed life's story, to introduce a non-linear interactive multimedia narrative, a way for users to interact with it, especially those who might not be familiar with the person being honored.

With the use of non-intrusive capacitive sensors, auditive feedback, and atmospheric lighting effects, all driven by a combination of microcontrollers and a computer; a robust experience was produced and enjoyed by dozens of people. The information gathered by the survey showed that users did not mind the use of technology to enhance the altar, on the contrary, they found it interesting and insightful, mainly because it kept the core elements intact and did not disrupt the offering.

There is still work to be done in the Neoaltar, technical problems and omissions from the authors lead to some discrepancies regarding missing or overlooked elements in the altar; but overall, most users regardless of their age group reacted positively to offered user experience.

Declarations

Author contribution statement

Rogelio Baquier: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data.

Ramon Barraza: Contributed reagents, materials, analysis tools or data; Wrote the paper.

Silvia Husted: Performed the experiments; Contributed reagents, materials, analysis tools or data.

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The authors declare no conflict of interest.

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