ARt chat - A Museum App combining AR, Art and Communication

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Abstract

Museum labels are often looked at more intensively than the actual work itself. And who says that the interpretation written there is the only possible one? *ARt chat* is an application that enables museum visitors to place their own opinions, knowledge or even questions as comments virtually in the exhibition space. Through the application, they can also discuss the artworks with others and follow and respond to comments even after leaving the exhibition. The application combines augmented reality, art and communication.

Keywords

augmented reality, digital participation, co-creation, user-generated content, museum studies, audience participation.

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Introduction

Digitization and social media are influencing our daily lives—the way we communicate with each other, make decisions, learn, work and spend our free time. We have long been accustomed to being able to express ourselves and participate everywhere. This tendency has not spared the cultural sector, were museums and other cultural institutions strive to keep up with the rapid pace of digital development. In fact, the explosion of ubiquitous technology has been developing hand in hand with the paradigm shift in the museum world, which was set in late 1980es as *new museology*, a movement in the museum studies marked by Peter Vergo´s seminal work of the same title.[1] The focus on the social role of museums, new styles of communication, inclusiveness and openness for active visitor participation have been the hallmark of the movement and a plea for new values and beliefs to be strived for in museum community. Forty years fast forward, there is still a lot of work to be done. In an environment characterised by participation and empowerment, many museums and cultural institutions are still seen as elitist and aloof. However, most museums did become institutions that are more centered on the needs of their audience. They are trying to fulfil not only the educational but also entertainment demands, reflecting the dynamics and the multicultural nature of the 21st century and favouring dialogue, interpretation, and experience.[2] It has become clear that it is no longer enough to exhibit objects and that the question of context should be central.

It has also become clear that in institutions that serve to create, identity and offer a space for representation, those who are to be represented should consequently be included in their work. The museum system and its traditional concepts have long been questioned, counter-designs developed, collection structures reconsidered and, with the involvement of the communities, new ways of telling stories have been invented. In this context the International Council of Museums (ICOM) discussed and approved a proposed resolution for a new version of the museum definition at a General Assembly in August 2022, concluding an 18-month participatory process of revision. The new version of the ICOM Museum Definition reads as follows:

"A museum is a not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums foster diversity and sustainability. They operate and communicate ethically, professionally and with the participation of communities, offering varied experiences for education, enjoyment, reflection and knowledge sharing."[3]

And though the bottom-up approaches have been increasing in the last decades, the idea that visitors should contribute to the museum creation with their own voices remains somewhat radical and provocative.[4]

At the same time, the process of museum transformation has been immensely supported by technology development. The democratization of the museum has been coinciding with the democratization of technology, characterized by its accessibility to everyone and everywhere. Moreover, due to its rapid expansion in everyday life, technology is for the young generations of museum visitors an aspect more familiar than any other in the museum context. To step into a museum that is not offering a digital layer is seen almost as a kind of anachronism that breaks the continuity of their reality experience. So more than just accompanying the museum experience, new technologies are being so powerful that they are clearly changing the very concept of the museum. As Tomiuc argues, "the issue is no longer whether to use this technology to recreate the museum experience, but how to use it for a maximum impact on the audience."[2]

And though the expected digital literacy might pose a barrier to the older generations, which is a worthwhile topic, the fact that museums are struggling to attract new generations of visitors is posing a bigger concern for their future. The continuity of daily experiences in a technological society is interestingly described by Peter Samis in his essay "The Exploded Museum":

In a technological world, the museum visit no longer begins when a person enters the building, nor need it end when she or he leaves. The museum's physical space is but one site—albeit a privileged one—in the continuum of the visitor's imaginative universe.[5]

In a museum experience, this symbiotic relationship of digital and analog is not only enabling the melting and intertwining of the pre- and post-museum visit time, but also of that which is presented/curated and understood/commented, and of that which happens behind the scenes and in front of the scenes. In the next chapters, we are presenting the process of development of a mobile AR application for museum use that was conceptualized with that incentive in mind and emerged as a product in a project dedicated to the empowerment of museum community.

Project and goals

nextmuseum.io is a cross-institutional digital community platform for swarm curation and co-creation, initiated by NRW-Forum/ Kunstpalast Düsseldorf and Museum Ulm, funded by the Digital Culture Programme of the German Federal Cultural Foundation as well as by the Federal Government Commissioner for Culture and Media.

On nextmuseum.io, curators or institutions can call for joint work on exhibition projects via an Open Call. Artists can submit artworks and participate in discussions, as can art enthusiasts, who have various opportunities to participate throughout the entire process. We believe that the multitude of opinions and concentrated knowledge that characterizes the online community creates an intelligent, powerful swarm that wants to be involved in shaping things. The platform offers tools and support for collaborative work in the art and tech sector, digital experiments developed with the project partner MIREVI (Mixed Reality and Visualization) from the University of Applied Sciences Düsseldorf and community events for exchange and empowerment.

Since its launch in July 2020, more than 30 Open Calls for collaborative exhibition projects have been made via nextmuseum.io and more than half of them have already been shown physically or digitally. The community now has more than 500 members and participated in about 75 events - from meetups with curators and expert talks on current topics (e.i., AI, sustainability, XR, NFT) to the tech art late night show "It's tech time!".

Related Work

The use of Augmented Reality (AR) technology in museums has been on the rise during the last decade.[6,7] In comparison with other types of technologies on the Mixed Reality spectrum,[8] AR has gained popularity in the cultural sector in general because of its broad availability and the simplicity of its use. Unlike Virtual Reality (VR) technology, which often requires expensive hardware and a more complex setup, mobile AR experiences only need a handheld device in the form of a (personal) smartphone or a tablet and are usually downloadable as applications. Furthermore, the App-based AR is increasingly being replaced by Web-based AR, which provides an even more accessible experience and on which great hopes are pinned in the coming years.[9] In this chapter, however, we want to give a short overview of the use of AR technology in museums, independently of its individual technological characteristics, primarily focusing on the multitude of its potentials and benefits for the mediation of museum content.

The typical feature of AR is the superimposition of a digital, usually visual content on top of the content that already exists in the real-life scene in front of the person. This sort of layering enables a myriad of possible symbolical uses, such as apparent overlapping of different times in the same space, a comparison between reality and image, notation or marking on the surface of reality, an image of hallucination or fantasy, a notion of transience and instability, an illustration of invisible processes, or telepresence of people or objects, to name just a few. When used in an exhibition context, these symbolic potentials open enormous opportunities, both for the exhibited content as well as their interpretation and mediation of the same.

In her text from 2017, Shelley Mannion, the Digital Learning Programmes Manager at The British Museum, reports on the conclusions that her team had drawn from their several years-long exploration of AR's potential in museum education. Acknowledging the inability to include all its variations, they attempted to classify different types of uses of AR in museums by suggesting four categories: (1) Outdoor guides and explorers; (2) Interpretive mediation; (3) New media art and sculpture; and (4) Virtual exhibitions.[7] While the first category relates to the museum content outside of its walls and coincides with the GPS based AR applications, the second one refers to some of the first interactive museum applications that engaged the visitors in physical interaction by combining wearables and facial recognition with the marker-based AR technology. The last two categories are jointly described as ones coming from artists, which were "the first to recognize AR's potential to challenge the curatorial hegemony over galleries."[7] The work of the artist collective *Manifest.AR* has here been a well-known example of guerrilla interventions in the museum space enabled by AR technology. [10] As Mannion emphasizes, this and similar examples illustrate "one of the strengths of AR for museums: its ability to provide multiple layers of invisible interpretation in galleries."[7] In a similar attempt to offer an overview of the use of AR technology in museums, Charlotte Coates lists several types of its adoption in museum contexts. Along with accompanying examples, these include adding explanation to museum pieces; bringing objects or scenes to life as a sort of art intervention; interactive and immersive projections; taking collections beyond their walls in a digitalized form and using AR for learning experiences, especially in different types of scientific museums.[6]

While both authors provide useful and interesting insights into the topic, they do not include any examples that would illustrate the use of AR technology for direct participatory practices of visitors in museums. All the examples refer either to a digital extension and transformation of usual interpretation tools, or to a form of AR artworks. The AR tools that would enable activities or support values related to visitors' engagement in a form of expression and exchange of their opinions or communication with the curators and the artists are not mentioned. Without wanting to conclude that such projects do not exist in AR form, this does show us that they are not yet common or influential enough to include them in such analysis as a separate category.

Similar attempts have, however, been carried out with other types of interactive and mobile technologies. By using digital technologies for creation of a personalized and interactive visitor experience through contribution and exchange of user-generated content, the installation called "The Cell" (2015) at the Information Age Gallery of The Science Museum London[11] and "Debatorial" (2020), an interactive online platform launched as part of the digital exhibition "Beyond States. The Boundaries of Statehood" at the Zeppelin Museum in Friedrichshafen,[12] bare some important similarities to our project. "The Cell" enables visitors´ participation in the installation by sending a text or adding an image via their mobile phones, which then unlocks additional content or include them in live polls. The contributions and the information gathered help in building upananonymizedlivedatarecordofthe Gallery'svisitors. The "Debatorial" is, on the other hand, a fully digital platform intended to facilitate exchange on several thematic areas via various formats. In addition to artist and curator talks, the formats include podcast, chats, quizzes, zoom meetings, surveys, and animated maps, all of which aim to promote visitors´ participation and transparency.

The application *ARt chat* that we present in the following lines merges the advantages of AR—its general accessibility and presence of content in real 3D space—with the qualities of participatory and personalized visitor experience comparable with the ones exemplified in the two mentioned projects.

Description of the functions and added value

Exhibition visitors can download the application free of charge from Google Play Store[13] or App Store[14] while in the museum or before the visit by following a link on the website. For using the application, they have to log in or register with their Apple, Facebook or Google account, or their email address and password. After that, a button "Start AR" appears for accessing a step-by-step guide. After reading the instructions for use and closing the guide, a QR code placed next to selected artworks in the exhibition can be scanned. After scanning the code and pointing their mobile device at the corresponding artwork, a small figure in the top corner is indicating when they can start entering their comments (Figure 1). Those can be placed anywhere in the 3D space by moving in the room and using drag-and-drop function on the screen (Figure 2, 3).

Figure 1: The view of the artworks commented with the [anonymized] application

If one wants her/his comment to no longer be publicly visible, it can be deleted via the trash icon. Visitors can also react to comments of other users by clicking on them and typing an answer. The reply appears in the application and is visible for all other users immediately after sending. Inappropriate comments by other users can also be reported and deleted after reviewing if necessary. For scanning a new artwork, users just have to click on the QR code symbol. By going back to the main menu, users can find the FAQs for more information

about the application and their account. On this page, also, a button leading to the already scanned artworks can be found, including the related user comments. Via the "my comments" button, users can see their own comments as well as the reactions of other users. Those two functions can also be used at home, after visiting the exhibition (Figure 4).

The conditions necessary for a cultural institution to become a place for participation, which were outlined by Nina Simon, are a good summary for some of the main driving forces in our project and can be recognized in the function of the described application. These include: (1) desire for the input and involvement of outside participants, (2) trust in participants' abilities and (3) responsiveness to participants' actions and contributions.[15]

Unlike elements that have already been implemented in the museum, visitors can choose to use or not to use the application without having information withheld. *Art chat* is intended to stimulate discussion among visitors.
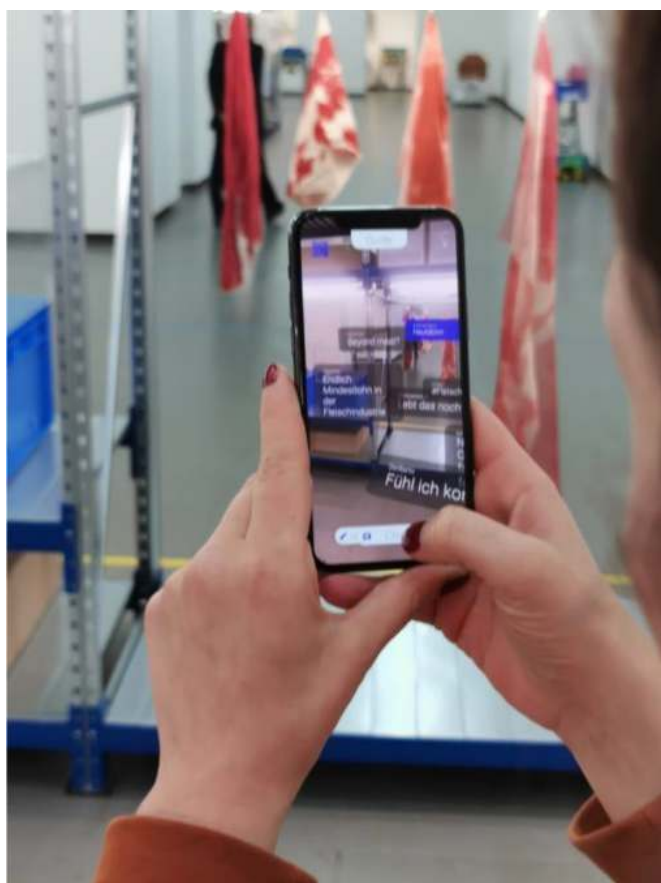

Figure 2: Placing a comment in 3D space in the exhibition

Since the content is freely configurable, the target group ranges from interested first-time visitors to professionals. During and after a museum visit, there is the possibility to interact with the exhibition and lead discussions with other visitors. In addition, one has a

sustainable storage of museum visits and one's own interactions, which can be retrieved long after the actual museum visit. As nicely put by Carey Jewitt in his essay on digital technologies in the museums—the hand held devices enable possibilities for innovative interpretation, especially in regard to decreasing curatorial control and allowing audience narratives "to override the search for a single authoritative voice."[16]

Also, the museum can collect, answer, and evaluate questions and comments, whereby only anonymized data regarding interaction with artworks and their comments are stored and evaluated.This data can be helpful, for example, in planning further exhibitions or optimizing a permanent exhibition. In the longer term, the application can be used and adapted for several museums and exhibitions. This has an advantage for the users who only need one application, but also for the museums, because they do not have to develop their own museum-specific application.

Finally, the application can also be used by the curators and artists themselves, enabling them not only to react and answer to visitors' questions and comments, but also to participate in the exhibition in a very personal and immediate way, pulling down the boundary wall between the official and authoritative museum discourse and the individual perspectives.
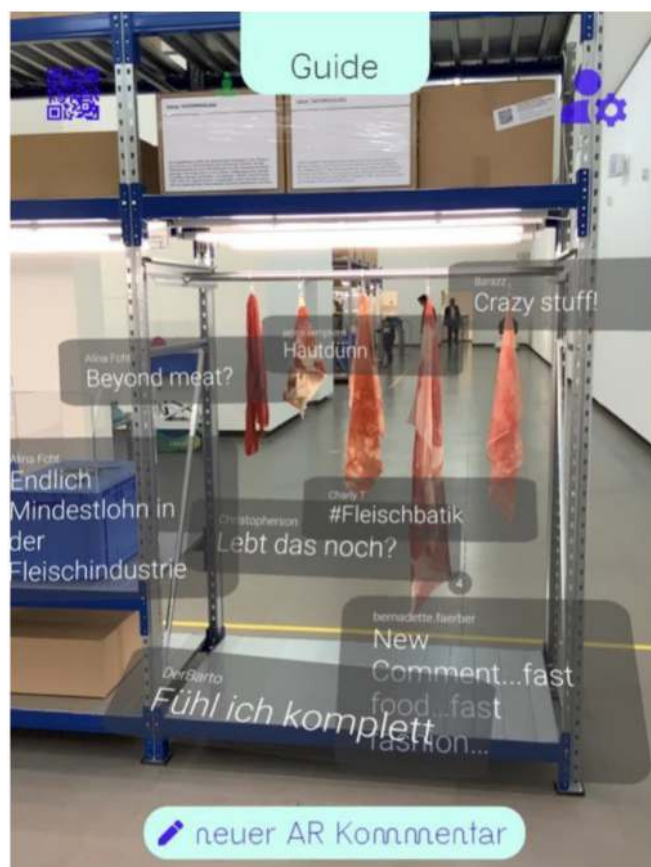

Figure 3: The cloud of AR comments in an exhibition

Background Information

The project was initiated as part of the partnership between nextmuseum.io and the MIREVI Lab of the Düsseldorf University of Applied Sciences (HSD), where students of media informatics and communication design took on the challenge of developing three different prototypes for interactive museum labels. After their successful development, the prototype of the *ARt chat* application was selected to be further developed with the HSD´s MIREVI Lab and tested in the partner museums (Figure 5).

The exhibition "Kunstreichgewächse" in Museum Ulm (September 2021) served as the first test site for the application. The prototype version only worked on a local smartphone or tablet with a demo version of the application that the visitors could get in the museum. By clicking on the AR button, the camera of the respective device opened to scan the QR code of an artwork. After scanning the QR code, visitors could write a comment and place it as a 3D element in AR using drag-and-drop function. The chat between different visitors was not yet possible at this stage. User tests and feedback helped in detection of the remaining bugs which were then fixed by the tech team.

In the advanced test version, the application continued to run only on locally installed tablets that could be borrowed from the museum. Here, the comments of other visitors who had already visited the exhibition or were currently in the museum have been displayed and updated in real time, and one could also reply to them.
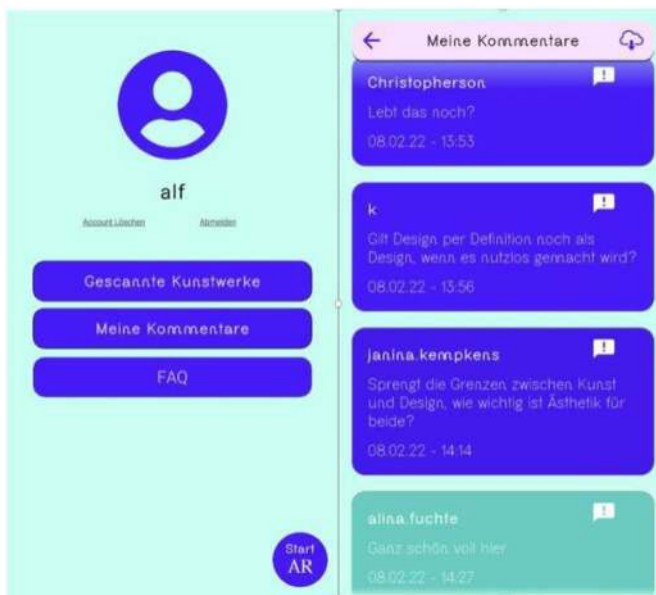

Figure 4: The view of the application's UI

It was possible to create a personal account that visitors can reactivate for each new visit. However, it was not yet possible to activate and manage the account from home. Finally, a handover to external partners for completion and release in the Google Play and App Store took place, making *ARt chat* accessible on users´ own mobile devices in the exhibitions "Subversives Design" in NRW-Forum Düsseldorf (2022) and "Wir müssen reden!: Die Münster-Krippe im Meinungsstreit" in Museum Ulm (2022). The final version is available for download in both stores and can be used on all AR-enabled devices. User accounts can be registered automatically via an existing Apple, Google or Facebook account. After visiting an exhibition and commenting on the artwork, visitors can continue the conversation from home and receive information about the chat activities they are involved in.

Technical Implementation

The application is based on several components: the Mapping App Immersal[17] was used to scan the artworks and to link it to the database and the corresponding QR code. The scanning process that is enabled by the Immersal App consists of taking several dozen photos of the artwork. Unity Immersal Software Development Kit is required to download scanned artworks (maps) from the Immersal online database via ID and needs to be integrated into the project. MongoDB database[18] was used to store data about the exhibition, the artworks, the users and the chat. Auth0[19] was used to handle all logins via email or social media. Heroku [20] was used to run the Representational State Transfer Application Programming Interface (REST-API) and Management App. Unity[21] served as a development environment for this repository and was used to compile the application. Following the open-source approach, the code as well as the technical documentation is made available on GitHub for other interested museums to use the application in their own exhibitions https://github.com/nextmuseum/unity-artchat.

Figure 5: The original concept prototype from the student workshop

Visitors' feedback and future directions

Starting with the idea of *ARt chat* as a tool for visitors to create their own version of museum labels, we offered a writer's workshop every few weeks in the exhibition "Subversives Design" in NRW-Forum Düsseldorf (2022) to provide space for creating texts as well as technical support when needed. It became obvious that visitors preferred to use short form and entertaining comments to interact through the application, similar to social media, rather than elaborate texts. So, we changed the outreach format by having a staff member walk through the exhibition, making people aware of the application, and providing support when needed. At the exhibition "Wir müssen reden!: Die Münster-Krippe im Meinungsstreit" in Museum Ulm (2022) guided tours were offered, where visitors could learn something about the exhibition and instantly share their thoughts via the application. Overall, visitors enjoyed using the application and had fun commenting on the artworks and interacting with other visitors as well as museum staff in the exhibition and at home. In a few minor parts, we could observe difficulties in the UX section, which are to be fixed in the next step. We are also planning to implement a swear filter, so that inappropriate content cannot be uploaded in the first place. There will also be some graphical customization and we will offer a selection of emojis to react to comments, which should make the application even more fun and intuitive to use.

In 2023, the extended version of the application was used in the exhibition "Protest! gestalten" in Museum Ulm. As mentioned, the documentation of the application has been published on GitHub and a several other museums have already expressed interest in using it in-house.

Conclusion

The *ARt chat* application exemplifies an innovative approach in using AR technology in museum context, focusing on active visitors' participation and experience sharing that extends the usual spatial and temporal givens determined by the institutional framework. In that sense, it provides a digital symbiosis of the real exhibition scene set in front of the visitor, with the imaginary one which unfolds in their mind´s eye. The technological possibilities are here purposefully capturing the feelings, opinions and questionings of the visitors, creating a moving sculpture of the exhibition atmosphere and the response it provokes.

Moreover, the application is enabling an uninterrupted museum experience, encouraging discussion and participation even after the actual museum visit. With its open-source character, it presents an extension of the nextmuseum.io platform dedicated to the swarm curation that aims at a wide community outreach and embraces its further use and development through museum and visitor communities.

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