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# Experiencing Art Museum with a Generative Artificial Intelligence Chatbot

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# Experiencing Art Museum with a Generative Artificial Intelligence Chatbot

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**Figure 1: A participant is using the (a) museum app to listen to information about the artowrk and (b) chatbot that facilitates taking a picture of an artwork, retrieving auditory and textual information about the work, and an interactive chat to learn more about it.**

## Abstract

Generative Artificial Intelligence (GenAI) chatbots start changing experiences with art for museum visitors by making them more interactive and engaging. However, it remains underexplored how GenAI chatbots influence visitors' in-field experience and interaction at art museums regarding finding information, engagement, and enjoyment compared to existing museum tour-guide applications. In this paper, we contribute the design and implementation of a smartphone-based chatbot that detects artwork, generates textual and auditory information, and interactively answers visitors' questions. To explore visitors' experience with it, we conducted a field experiment (N=30) at the National Art Museum, comparing it to the existing museum application. Our results indicate that visitors showed higher artwork engagement with the chatbot than the museum application. Moreover, they enjoyed an interactive experience using the chatbot to learn about the art collection and have equally preferred textual and auditory information representation.

## Keywords

Museum experience, Chatbot, Tour guide, Generative AI

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## 1 Introduction

Interactive museum experiences engage visitors with art exhibitions more easily [11]. Nowadays, it has become a common practice to redefine and rethink the way visitors engage with art, history, and culture by involving different types of media and technology [7, 16, 30]. These types of technologies span from 2D interactive displays [40],

audio guides [26], tangible smart objects [28], robot-based [27] and extended reality solutions [1, 25], and interactive chatbots [2, 45]. However, these existing solutions lack personalization of museum experiences, and museums are limited in catering to diverse visitor preferences in learning styles and tempo and excluding people with disabilities, e.g., visual impairments, to experience Augmented Reality. Previous work also proposed chatbots as virtual guides to provide information on demand [45] by interacting via spoken language or text [14]. Their main limitation is predefined answers to received requests from museum visitors [2]. With generative Artificial Intelligence (GenAI), it became easier to provide interactive and personalized experiences using mobile solutions [35, 36]. Although some museums have employed chatbots as tour guides [9, 14, 36, 42], we lack an understanding of how these proposed chatbot-based solutions influence visitors' experiences compared to museum apps.

In this paper, we present a mobile GenAI chatbot for engagement with an art exhibition that introduces the collections, answers visitors' questions, and helps visitors locate themselves within the museum (Figure 1). The visitors can take a picture of a painting using a smartphone, and the chatbot provides the painting's name and a summary, similar to analog information boards. Based on natural language processing, it responds to the previous dialogue and switches to other topics regarding the user's intent. To evaluate user experience with a chatbot and the museum app, we conducted a field experiment (N=30) comparing the chatbot to the existing interactive museum app during their regular museum visits to the Swedish National museum [1]. While our quantitative results indicate that the chatbot did not provide clear advantages compared to a museum app our qualitative results show that chatbot participants paid more attention to artwork details and enjoyed the personalized experience.

## 2 Related work

### 2.1 Enhancing Museum Experiences

Primary methods to enhance museum experiences include 2D interactive displays [40], audio guides [26], tangible smart objects [28], robot-based [27] and extended reality solutions [1, 25]. They typically focus on education [21], reflecting on values [32], raising visitors' awareness [12], facilitating social experiences [8], and increasing fun and engagement [17]. At the same time, the content is conveyed via text, audio, and visual augmentations [13] on standalone and mobile devices [18]. The former presents facilitates browsing content, interaction with specific media, problem-solving tasks, or games [23]. The latter offers extended content, language choices, and mobility. The classic example includes audio guides adopted to facilitate self-guided tours [29] and offer descriptive information. Some mobile applications determine visitors' location and provide indoor navigation [37], facilitating a self-guided tour [4]. Alternative approaches are: (1) gamification, which is designed as gameplay or shared tasks [6], or storytelling, where visitors follow a narrative journey in museums [33], and (2) Extended Reality that employs headsets to transport visitors to different periods, simulate historical events, and overlay existing artifacts with additional information [41]. Most AR solutions employ point-and-touch interfaces that require pointing towards an artifact with a smartphone camera and use the touch screen for interaction [1, 25]. However, this might lead to fatigue and interaction within the screen's boundaries, which disconnects visitors from exhibitions [22]. AR headsets help to overcome this problem, but lead to clutter issues [47]. Therefore, more recent solutions have focused on employing GenAI chatbots as museum guides that facilitate human-like interaction between visitors and museum artifacts, which we further explore within the scope of this paper.

### 2.2 Chatbots as Museum Guides

Chatbots as tour guides can enhance museum experiences and provide personalized guidance. With Generative AI, chatbots can generate responses based on queries and interact with multimedia [24] attracting new audiences [43]. Previous work has been piloting AI-based solutions for almost two decades, e.g., Google's Dialogflow [15], Facebook's Wit.Ai [10], IBM's Watson Assistant [20], Microsoft's Bot Framework [31] and Amazon's Lex [3].Several museums have deployed chatbots to enhance museum experiences. Prominent examples include: (1) the chatbot in Anne Frank House in Amsterdam [19] offers a predefined conversation about the life of Anne Frank and the museum's exhibits and (2) the chatbot of the National Museum of the 21st Century Arts in Rome [39] helps visitors to organize their visits and guides them in predefined conversation and through word or image selections.Recent research has proposed mobile chatbots to facilitate human-like conversations [36]. We build on the success of these works by designing and implementing an interactive mobile chatbot to provide visitors with information on demand and facilitate personalized exploration. Since these solutions were evaluated in front of a laptop [35] and never compared to visitors' experience using an interactive app provided by a museum [36], we conducted a field study comparing the chatbot and a museum app to explore art exhibitions.

## 3 Chatbot

The chatbot is a mobile tour guide that introduces the collections, answers visitors' questions, and helps with indoor navigation (Figure 2). The chatbot can receive three types of messages: (1) image, (2) text, and (3) audio. Visitors can take a picture of a painting using a smartphone, and the chatbot provides them with the painting's name and a summary. Users can ask more questions about paintings by typing or sending a voice message as frequently as they want and at their own pace. Visitors can also use the paintings to locate themselves within the museum since some museums can be difficult to navigate by either asking the chatbot or by choosing the option "Show your location", which shows a map of an exhibition with the marked location of the recognized/photographed painting. We prompted the chatbot for conversations with visitors and returning results in JSON format: "You will be provided with a conversation with a visitor in a museum. Return the result in JSON format. Your task is to complete the conversation with the context in JSON format. Recognize its intent between "navigation" and "artwork". We set the chatbot to generate a short (< 120 words) introduction: "You are visiting a museum with your friend. Based on the text in the given text, summarize it in no more than 120 words in a vivid and natural tone." The chatbot also abstracts the content: "Based on

[1] https://www.nationalmuseum.se/en

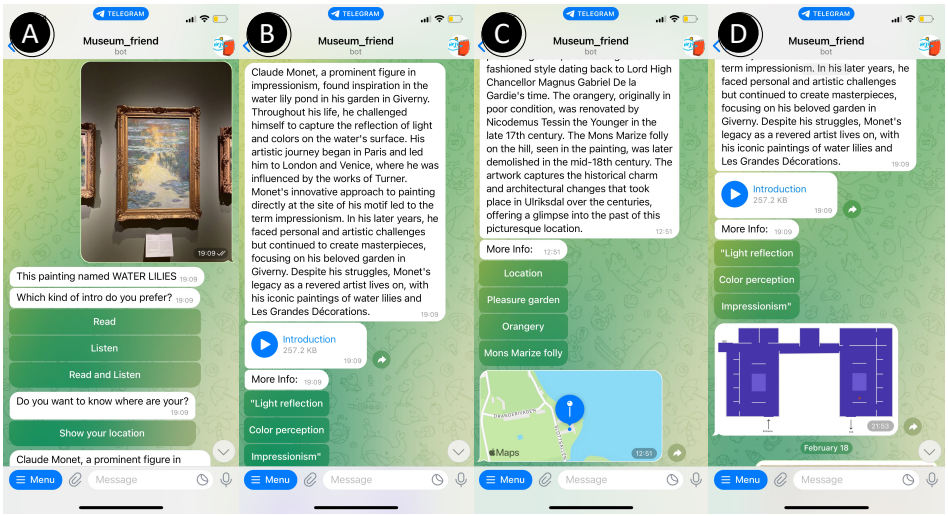


**Figure 2: Interaction with the chatbot starts with taking a picture of a painting, which returns its name options to receive more information about it as text, audio, or both text & audio. Visitors also have the option to request their location within the museum (A). After tapping on "Read and Listen", visitors receive summarized information about the painting in a textual and auditory form (B). Visitors can continue requesting information from the chatbot by tapping on options under "More info" (C). If visitors tap on "Show your location", the chatbot returns a map of the museum with a marked location of the painting (D).**

the given text, select three aspects that you think visitors are most eager to know about the painting. Only provide the names of these aspects, which should be no more than five words, return as string, split with ',' ". Lastly, the chatbot was prompted to generate an introduction for the chosen option: "Introduction the aspect of this option with no more than 70 words." (Figure 3).

## 4 Evaluation

We conducted a field evaluation comparing the museum experiences using the chatbot and the museum application with the following research question: *To what extent does a chatbot enhance visitors' experiences in art museums compared to museum apps?*

This study was designed to be a between-subject comparing: (1) the chatbot (Figure 2) and (2) the museum app (Figure 4). We recruited 30 participants (14 female, 15 male, and one non-binary) aged between 17 and 64 ($M$ = 30.0, $SD$ = 13.7). Seventeen participants have visited museums over five times a year; four visited 3 or 4 times, and nine visit museums less than two times a year. Twenty participants thought they were good at appreciating artworks, and five mentioned that they would prefer avoiding guidance when visiting museums. The participants used a Mi A3 Android phone with Telegram and National museum Visitor Guide app and earphones. We used screen video recording during the visit for later analysis, and for the chatbot, we additionally logged the interactions. We measured: duration of interaction, overall tour experience, including the ease of finding information and learning about the artworks, understanding the exhibition's idea, finding own location in the museum, distraction by the app or the chatbot, interactivity and fun of the experience, and chatbot experience using a 5-point Likert scale. Through a random participant assignment, 15 went on a museum tour using the museum app, and 15 used the chatbot.

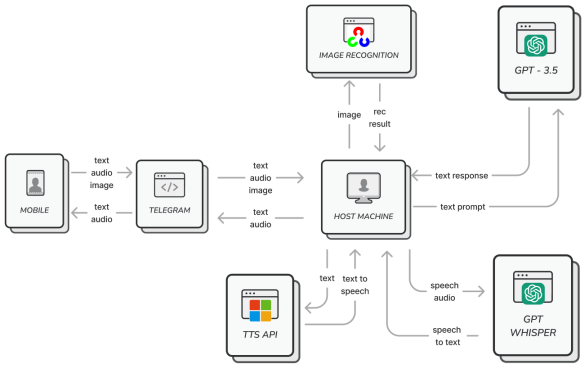


**Figure 3: The chatbot has four API services: (1) OpenGL to recognize paintings, (2) OpenAI's GPT API (GPT-3.5 Turbo) to generate ChatGPT responses, (3) OpenAI whisper API as Automatic Speech Recognition (ASR) to convert speech into text, and (4) Microsoft Text to Speech (TTS) API to convert text into speech. We integrated it into the Telegram chat, which receives text, audio, or an image as an input, forwards it to the host machine, and provides text or audio as an output within a few seconds. The generated introduction is based on the knowledge base that includes a detailed introduction of the artwork, the artist, and related materials about the content of it. To ensure the content's accuracy, we collected the knowledge only from valid sources, such as Wikimedia and museum official websites.**

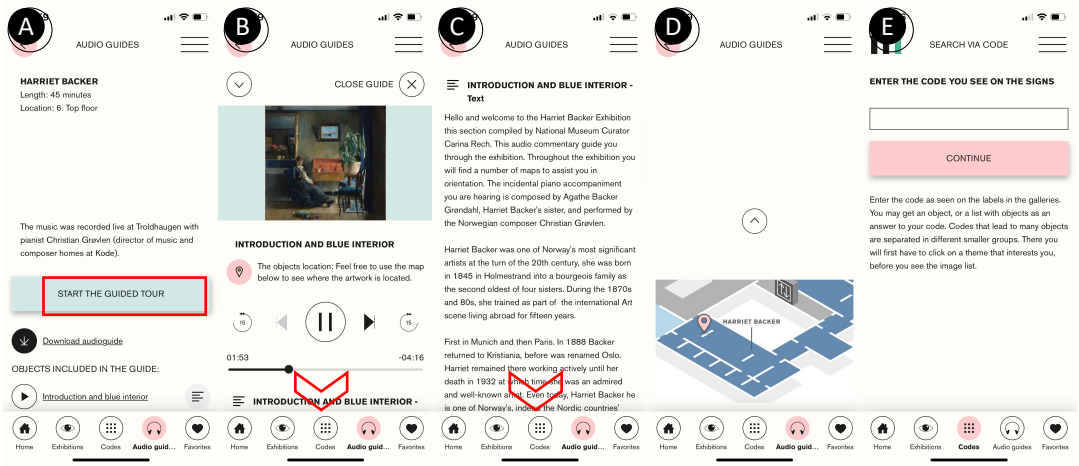


**Figure 4: Interaction example of using the museum app: (A) After selecting an exhibition, visitors can start a guided tour, (B-C) they can listen or read more information about it by scrolling down, (D) locate themselves within the exhibition by scrolling, (E) visitors can manually enter the code they see on the signs next to paintings or artifacts in the museum.**

During the tour, participants freely explored the exhibition with the test phone, which had a screen recording and earphones, without receiving any particular tasks. The average tour per participant lasted 10 to 60 minutes.

# 5 Results

## 5.1 Quantitative results

*5.1.1 App vs. Chatbot.* On average, the visitor spent 25 minutes interacting with the app and 23 minutes interacting with the chatbot, used the listening function 4.4 times using the app and 4 times using the chatbot. They listened to the full audio descriptions 2.5 times using the app and 3.2 times using the chatbot. The visitors listened to more than half of the description 0.9 times using the app and 0.5 times using the chatbot, and less than half of the description 1.9 times using the app and 0.4 times using the chatbot. With both the app and the chatbot, the visitors checked their location within the museum on average once.

*5.1.2 Chatbot interaction.* While using only the chatbot, the visitors took, on average, seven pictures ($SD = 4, min = 3, max = 16$) of artwork per tour, used the reading option on average 2.2 times up to ten times ($SD = 2.6, max = 10$), the listening one 2.7 times ($SD = 1.9, max = 7$), and reading & listening 1.9 ($SD = 4.2, max = 16$). The visitors conversed with the chatbot on average 1.4 times ($SD = 2.3, max = 8$).

The results regarding tour and chatbot experience are shown in Figures 5 and 6 respectively.

## 5.2 Qualitative results

*5.2.1 Engagement with Art.* The chatbot made participants spend more time at paintings and pay more attention to details: *"It was a great experience for me to get the additional info and learn more about the paintings that interested me. It made me spend more time observing the painting as well with details or info I might have missed otherwise."* [P21]. Participants liked that the chatbot provided more information about the art they are curious about: *"I liked the fact that the chatbot gave more information than the standard texts that the museum gives next to the paintings. For those paintings that I was more interested in, it helped me get a deeper understanding of it"* [P5]. Although participants find the information useful, they did not like the AI-generated text and would like the audio description to sound more human-like: *"Useful for a better understanding of the artwork, better than reading the signage below the painting."* [P11]. The app participants wanted more information (N = 3) and reported that the app provides a small portion of information: *"There could be more information on the history part of the time period (for this general exhibition or for the specific artwork). There could also be commentary on the artist's personal history."* [P13]. Participants also mentioned that the museum app was too restrictive and they wanted to get more information: *"I think it is a bit restrictive as you're limited by the artworks chosen on the audio. It would be better if you could select the artwork you wanted and could listen to it"* [P6].

*5.2.2 Information retrieval.* The visitors mentioned detecting the painting using image recognition was simple, convenient, and quick. As P19 mentioned: *"It was very simple to use, and a fluid experience which helped gain knowledge of the paintings."*. However, some participants experienced errors in image recognition, such as recognizing a wrong painting and not recognizing a painting from particular angles. The participants were annoyed when they got a wrong recognition result: *"taking pictures of the works for the library of the bot at different angles could be helpful."*[P18]. Sometimes, the chatbot took about five seconds to generate the content: *"it takes time to generate the explanation"* [P22]. However, the visitors with the museum app mentioned that finding the artwork audio was difficult: *"It's not easy to find the artworks from the list that I want to know."* [P15]. The app participants mentioned navigation problems and finding the right information: *"Disorienting with all the subcategories, hard time finding the right subcategory to the right room, found the audio guides at the end."* [P8].

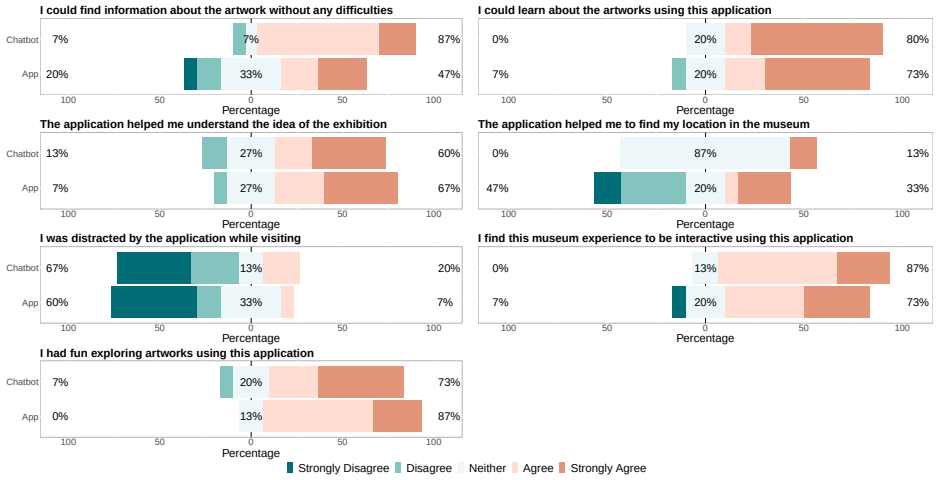


**Figure 5: We found that it was not easier for the visitors to find information about artworks using the chatbot ($Md = 4, IQR = 0$) than the app ($Md = 3, IQR = 1.5$). The visitors could learn about the artworks comparably using the chatbot ($Md = 5, IQR = 1$) and the app ($Md = 5, IQR = 1.5$), and understand the exhibition's idea using the chatbot ($Md = 4, IQR = 2$) and the app ($Md = 4, IQR = 2$). Finding one's own location in the museum was comparable to using the chatbot ($Md = 3, IQR = 0$) and the app ($Md = 3, IQR = 2.5$). Both the chatbot ($Md = 2, IQR = 2$) and the app ($Md = 2, IQR = 2$) led to a low level of distraction. Lastly, the visitors found their experience interactive with the chatbot ($Md = 4, IQR = 0.5$) and the app ($Md = 4, IQR = 1.5$), and they had fun using both the chatbot ($Md = 4, IQR = 1.5$) and the app ($Md = 4, IQR = 0.5$). Overall, for the questions regarding the tour experience, we accept the null hypothesis since we did not observe statistically significant differences among none of them, as shown by the Mann-Whitney U test ($p > 0.05$).**

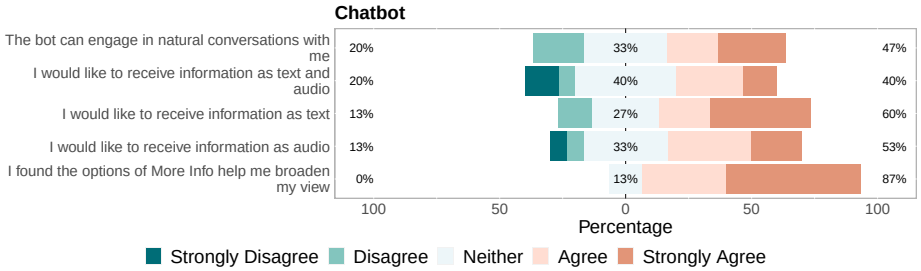


**Figure 6: The visitors found that the chatbot could engage in natural conversations ($Md = 3, IQR = 1.5$), comparably preferred receiving information using audio ($Md = 4, IQR = 1$), text ($Md = 4, IQR = 2$), and text & audio ($Md = 3, IQR = 1$), and indicated that the option "More info" could help them broaden their view on the exhibition ($Md = 5, IQR = 1$).**

*5.2.3 Content presentation.* About half of the chatbot participants (N = 7) were satisfied with the content presented by the chatbot because it was informative, provided them with a deeper understanding of the artwork, and the suggested extra options assisted in getting more information about the artwork: *"I liked using the system [the chatbot] to get more in-depth knowledge about some of the paintings, where the basic information from the museum was a bit lacking."* [P20].On the contrary, they mentioned that the text was too academic, might not be accessible to everyone, and that some text was obviously AI-generated: *"The text is more academic than a real docent would be. This is not an issue, though it may not be accessible to everyone."* [P17].

## 6 Discussion and Future work

The chatbot and the application were easy to learn and did not lead to additional reported distractions. It fits the context of art museums very well since looking at artworks is the main activity, but it may have different requirements in science and technology museums. Museum visitors typically take pictures of works they enjoy, suitable for implicit detection and information retrieval [38], which we employed in our experiment. In contrast, the app visitors entered the painting codes to retrieve additional information, which was inconvenient. Finding or retrieving information about the artworks was the main chatbot feature that improved visitors' experience compared to the museum app. Instead of learning new apps at every new museum, visitors can text the chatbot or send a voice message using a familiar chat-like interface. Although we did

not account for personalized prompts, in future versions, visitors will set up the chatbot to account for the granularity of information and language complexity. Our results indicate that locating visitors within the museum is a useful feature. However, it has to be further explored in large-scale museums since we focused on one particular exhibition where the visitors did not have to locate themselves very often [34, 46]. Only a few interactions with the system distracted the visitors, and participants spent more time at the paintings using a chatbot since it provided more information than the museum app. Future work can focus on museum experiences in pairs by giving one visitor a chatbot and another an app and asking them to switch after a while. This way, one can expose participants to both options and test two participants simultaneously.

The chatbot participants found the AI content informative and liked the "More info" option for more information. This might effectively meet visitors' contexts in different knowledge backgrounds and art appreciation skills. However, the generative content relies on the data in the knowledge base [44], and the chatbot replies included repetitive information because there was not enough introduction data for that artwork, which typically happens with infamous artworks or artists. Interestingly, the visitors asked most questions about the artist, the meaning of the collection, the painting elements, and drawing techniques, requested more information, and commented on things, which is in line with previous work [5]. Interacting with the bot by chatting helped build active connections with the artwork since visitors can ask questions or share their thoughts, similar to a human tour guide. Admittedly, the chatbot had more functionality than the museum app and allowed listening to more details since it provided an option to ask questions on the go. Interestingly, it did not quantitatively improve participants' experiences, but qualitatively participants paid more attention to artworks and enjoyed their personalized experiences via chatbot conversations. Therefore, future work needs to quantify the aspects related to attention by integrating wearable eye trackers or smartphones' front cameras.

The chatbot generates more content than prerecorded audio files provided by the museum app, which might lead to participants listening longer to the chatbot than to the app. The visitors also listened to the full description more often with the chatbot than with the app.Possible reasons for this include visitors' curiosity and the fact that they asked their own questions, which motivated them to listen to audio recordings fully. On the negative side, the answers of a chatbot can be wrong due to ChatGPT hallucinations. We tried to account for it by carefully preparing the prompts and contextualizing the chatbot environment. However, to prevent possible misinformation from GenAI chatbots, future work should consider quality and truth control to compare the provided information with the verified information from the museum. This paper focuses more on the visitors' experience of having an interactive tour companion with bi-directional communication, and we did not consider all possible solutions that could have prevented misinformation.

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