Presentation of Visual Art in Interactive 3D Environments

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Abstract

This paper looks into exploring and implementing innovative methods and technologies for interactive presentation of visual artworks in 3D virtual environments. We present two projects along these lines, and describe their effects on user engagement and interaction. We conclude that the interactive context of presentation, rather than just the realism of reproduction, is a significant factor for curating an engaging exhibition by applying new technologies as Virtual Reality and free-view point video.

Author Keywords

Art Presentation; Art Communication; Interaction; Virtual Reality; Free-viewpoint Video

ACM Classification Keywords

H.5.m. Information interfaces and presentation: Miscellaneous.

Introduction

New Media has not only revolutionised the way art is found and appreciated, but also has greatly altered ways in which it can be presented. In turn, this has changed the way in which curators make exhibitions of work for new technological methods of display, such as online applications and within virtual worlds. Looking in the context of employing new technologies for artistic

exhibition, Virtual Reality (VR) offers us exciting new possibilities and with it, new techniques for the curation of digitised versions of traditional art works. Furthermore, the inherent interactive features of using VR (especially on the world wide web) can be implemented in the presentation of art works, allowing for a deeper experience of the working this unique environment.

Inspiration

The presentation of art to a broad audience began with the Parisian salons in the late baroque time. In these salons paintings were displayed on the whole wall without any concept of placement and just following the rule – large paintings on the top, small ones on the bottom. Later on in the 19th century artworks were usually presented only on eye level. Since the 20th century the ideal room for exhibiting visual art is believed to not overwhelm the artwork and it should be as simple as possible [8]. There are no exact rules how a painting or a sculpture should be presented, although curators usually stick to certain well-established display patterns. Furthermore, it is very common for the artist himself to take over a few of the curatorial tasks in the process of creating an exhibition.

Still, the use of new technologies in the field of art presentation gives artist and curators numerous exciting opportunities. "New media art presents the opportunity for a complete rethink of curatorial practice, from how art is legitimated and how museum departments are founded to how curators engage with the production of artwork and how they set about the many tasks within the process of showing that art to an audience." [4]

As a result, the innovation potential in the context of media presentation and exhibition spaces design is very high. Whereas the presentation environment can manipulate the impact that an artwork has on the viewer, a custom-designed space and interactive elements can increase the viewer's experience. In the context of employing new technologies for art display, Virtual Reality and the benefits it offers can be very useful. Furthermore, these can be mirrored in the form of 3D interactive features for the Web, which can be used for presentation of art as well.

In this context, the projects presented here aim to contribute towards escaping from the common space for art presentation by creating a virtual application that benefits from the technology used and augments the presented artwork by offering an interactive and enhanced audience experience. It is not our intention that the virtual space should look and feel like the real world, which the majority of the current applications are aiming to achieve, but rather provide an escape from reality, offering the option to view and explore things in a simulated world and to create knowledge about the artworks of interest. Therefore, our purpose is to offer a different experience from that the user has in a common exhibition space.

Approach

One of the challenges in presenting modern exhibitions is to invite the viewer not just to stand and stare but also to think along with the work, its curation and its history in the most engaging way. Following Cornock and Edmonds [2] concept we want to turn the *spectator* into a *participant*. Moreover, when using VR there is a tendency in current applications to design virtual environments exactly like that of the real world.

However, there are characteristics in using VR technologies, which can be applied to offer the option to view things in an imaginary world, a different form of escapism than that which is often prevalent in physical museums and galleries.

In order to develop a more sustained link between the participant and the artworks, we want to create *relaters* as defined by Edmonds et al. "Relaters are aspects that help the continuing relationship with the artwork to grow so that the audience returns to the work on future occasions." [3] We want to intrigue the user to learn more about the presented art also after using the application. Furthermore, our aim is to initiate a process of questioning.
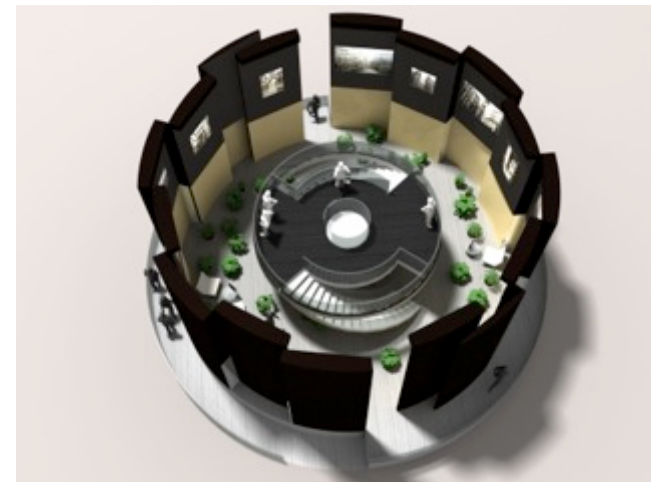
New media artists are expanding their practice continually using increasingly complex technical tools. We present two projects which explore not only the presentation of visual arts using the state of the art VR technologies, but also investigate the sense of escapism and journey, which audiences seek out when selecting to engage with viewing contemporary new media art in this medium. The aim of the first project is to design an artificial presentation space, which contributes to the creation of an appropriate atmosphere for better perception of the message the artwork is intended to deliver. We analyse not only how art works (such as paintings) in VR are observed and perceived, but also their relationship to the virtual surroundings they occupy and how the users of VR equipment navigate around a virtual space to view them. For example does a virtual chair encourage more engagement with a painting than not having the chair there at all? We do this first by creating a framework in which we design virtual pavilions in the traditional style

Detailed view of the Virtual Reality showroom

of physical pavilions (like those which exist in the physical world), but also using the advantages of unique VR surroundings to which VR world designers and users are already accustomed. A deeper investigation is sought by a second project, which promotes interaction from observers through the use of a specially constructed common area in which actors perform in a virtual environment populated by distinguished and easily recognisable portraits in the virtual space. The intention here is to stimulate the viewer to step out of the role of passive spectator, to become an active participant and to discover some pieces of information hidden in the environment, gaining knowledge about the observed objects in an entertaining manner.

Project 1: Use of VR in the presentation of visual artworks

Figure 1. Image of a Virtual Reality pavilion

After the user finds the correct viewpoint a 2D image of the painting and some additional information on the bottom appear

An actor taking the position of the portrait in one of the presented artworks (above) and the corresponding 3D model (below)

Using 3D computer graphics software an exhibition environment is created. The pavilion (Figure 1) is designed for displaying Stefan Hoenerloh's paintings of an imaginary abandoned city. The pavilion is divided into two horizontal levels, which further considered should represent two different worlds - one of the artist's uninhabited city and another, more similar to ours, full of life. On the ground level the visitor is welcomed in a bright space with green plants and comfortable seats. On the upper level, a platform functions as a lookout stage for observation of the imaginary city, giving a panoramic view experience. In the same time, standing on the platform the viewer can still see the ground level, which in contrast to the paintings, is full of life.

The possibilities of stereoscopic visualization of the pavilion both on a desktop and on immersive VR systems have been investigated. This approach gives us an opportunity to design environments in which the artworks can fully expand their impact and the user has the possibility to have an interactive experience and explore the art in a different context.

Project 2: A WebGL implementation of a free-viewpoint video

Another way to give the user an opportunity to explore artworks interactively in a 3D virtual environment is by using a free-viewpoint video implementation for the Web. The aim of the second project is to present five portraits, all inspired by the previous one, and tell the story that connects the artworks in a way that is engaging for the user. In a studio with chroma-keying backdrop, an actor was recorded simultaneously by 15 fully calibrated cameras. The five portraits were chosen not only because of their connection to one another but

also because the actor can easily take the pose of a portrait and change his body posture to match the next painting. After capture, the actor's images in all video streams are segmented and used to carve a 3D model [5]. Applying this technology, the user is enabled to look from the artist's perspective. In particular, the user is challenged to find the exact viewpoint in the virtual space where the painter was positioned while painting. An empty frame metaphor was used to help the user in this task (Figure 2). Once the correct viewpoint is discovered, the actual image of the portrait appears and a hidden piece of information related to the current painting is displayed [6]. The user is attracted to learn new knowledge as part of a narrative and not just information. The storytelling element of the application suggests an engaging way of communicating the background details of the paintings.

Figure 2. WebGL based interactive 3D application. Top: virtual environment showing the empty frame metaphor. Bottom: painting storyline.

Communicating the Information behind the Paintings

People always bring something with them in terms of knowledge and expectations when attending exhibitions. When an image is presented as art, the way people look at it is affected by a whole series of assumptions about art [1]. The perception of art depends of one's background. Quoting Duchamp: "Art is never completed until someone is looking at it". The way we see things is affected by what we know or what we believe in. Seeing comes before words. The relation between what we see and what we know is never settled. We never look at just one thing; we are always looking at the relation between things and ourselves. An image is a sight, which has been recreated or reproduced. Every image embodies a way of seeing, usually the view of the maker not the observer. But more important: it is not the things we see but the things we remember.

The task of presenting artworks in a more engaging way can be considered in the framework of the Data-Information–Knowledge continuum [7]. The main observation in the discussed context is that different kind of presentation of selected artwork can create different kind of knowledge of the participant. The whole process consists of two phases: curator's and participant's. The first one is designing the presentation scenario. When preparing the artwork for presentation to the public the curator gathers data, information and knowledge and produces the presentation environment deciding how to show the given artefact. This part is completely controllable by the curator. The second phase of the process is the interaction of the participant with the presentation environment - here the result is not fully controlled by the curator. From the participant's perspective the presentation environment can be considered as information, which is exposed for observation and study, with the expectation that when exploring it the observer can create knowledge about the topics considered. The transformation from information to knowledge has almost a 'magical moment' when things come together and the picture gets clear. Based on this observation the information in the developed application in the framework of the second project is not delivered at once but the user must perform a small task interactively in order to 'gain' it. This step-by-step approach aims to contribute towards transforming the information into knowledge.

Studies

For the second project, two user studies have been performed. The first study compares the proposed approach for presenting art in an interactive virtual environment with that of a conventional 3D art gallery. Both virtual exhibitions have identical visual and text information, delivered in two different ways – as a typical virtual gallery and using our interactive application. The results showed that although users did not necessarily find our proposed approach more informative, it was definitively perceived as a more enjoyable and engaging tool for presentation of visual art, which demonstrates the potential of our approach to applying interactive 3D environments for presentation of visual art.

The second study took place at the Victoria and Albert Museum in London where participants were presented with an interactive installation, which enabled them to interact with the five paintings presented through the interactive application. The preliminary findings of ethnographic video analysis indicated that there is a

First study: participant

Second study: Installation setup at the V&A, London

significant effect of the subject's interaction with a simulated social environment within this system.

Conclusion

New technologies such as Virtual Reality and free-viewpoint video provide us with exciting opportunities to present artworks in an interactive and more engaging way. One of our main findings is that the inclusion of a storytelling element in the visual art presentation increases the activity of users and motivates them to gain new knowledge about the displayed artworks. The two projects presented here give us an example of how both technological and creative skill sets can be applied in the presentation of visual artworks in 3D interactive environments.

Acknowledgements

References

[1] Berger, J. *Ways of Seeing*. BBC and Penguin Books (2008), pp. 8.

[2] Cornock, S.,Edmonds, E. *The Creative Process where the artist is amplified or Superseded by the Computer*. Leonardo, Pergamon Press (1973). Vol. 6, pp. 11-16.

[3] Edmonds, E., Muller, L., Connell, M. *On Creative Engagement*. Visual Communication. Sage Publications (2006); 5; 307.

[4] Graham, B., Cook, S. *Rethinking Curating. Art after New Media*, The MIT Presss (2010), pp. 283.

[5] Maleshkova, J., Pansiot, J., Grau, O. *Through the Painter's Eye: Interactive 3D Presentation of Paintings on the Web.* In *Proc. Conference of Visaul Media Production - CVMP 2012,* ACM Press (2012), pp. 18.

[6] Maleshkova, J., Purver, M., Grau, O., Pansiot, J. *Presentation and communication of visual artworks in an interactive virtual environment.* In SIGGRAPH Asia 2013 Posters, page 37:1, New York, NY, USA, November 2013. ACM

[7] Masud, L., Valsecchi, F., Ciccarelli, P., Ricci, D., Caviglia, G. *Visualization as transformation process within the Data-Information-Knowledge continuum*. 14th Int. Conf. Information Visualization (2010), pp. 445-449.

[8] O'Doherty, B. *Inside the White Cube: The Ideology of the Gallery Space*. University of California Press (1986), pp. 14.