SEEING

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Abstract
Augmented Reality (AR) has the potential to be an interface to access and display information for guided tours in museums and galleries, allowing visitors to access information previously only available in books and art history lectures. This would enhance the experience for visitors giving them a greater appreciation for the artwork on display. This paper looks at new advancements in the area of AR and how it can be used to enhance guided tours in galleries and museums, giving visitors greater levels of interaction and a deeper level of understanding allowing visitors to bring more to their seeing.

Keywords: *Augmented Reality, museums, knowledge access*

A person looks at a painting in a museum or a book they can either like it or not. They can read the accompanying paragraph or not to gain some descriptive insight, but real critical evaluation and analysis comes from having some knowledge about the artist or the movement or even the time in which it was created. People visiting a gallery or museum without the prior knowledge or skills gained through studying art history and art appreciation do not experience the artworks in the same way. As acclaimed architect and visual artist, George Nelson said, "What we see is what we bring to the seeing".

Art appreciation, as part of art history, teaches students how to read a painting. Showing them how to see and understand rather than just look. Knowledge is gained by discussing different aspects of the painting from the structure and form of the painting to the colours, theme and application of the paint. Further information can be deduced by looking at the context of when the artwork was created, from the sociopolitical situation of the time, the artist herself, her influences, who commissioned it and the work of their contemporaries which may be reflected in the work.

The majority of art appreciation classes take place in a lecture room or theatre where the lecturer shows slides, goes through notes and facilitates a discussion. These classes create an appreciation in the students for the different styles and art movements as they gain a greater understanding about the works of art, why they were created and the backdrop that they were created against. These classes are taken by those who have a real interest in art or the classes may be part of a wider program of study.

Galleries and museums understand this and so provide description plaques on the walls beside the paintings. They also facilitate other information points such as brochures, guided tours, lunchtime and evening lectures.

One of their more popular tools is the guided tour in the form of an audio headset, where a visitor can navigate through an exhibition while the story of the artist and explanations about their work are verbally narrated. This type of tour has been in use for at least two decades, but is still popular and effective. However, with some recent developments in technology, it is possible that this form of tour, though well established, is just a stepping stone.

Augmented Reality (AR) is an experience that supplements the real world with a virtual layer of information (Lowry, 2015). While it has been around in various forms for the last ten years and discussed for 20 years before that, recent improvements in the technology have created a renewed interest in the technology among reviewers (IoT Institute, 2016; CNET, 2017; Rolling Stone, 2017; TechRadar, 2018; The Verge, 2018; PC Magazine 2018).

These new features have moved AR onto a new level of interaction and increased interest in the new wave of AR headsets. These developments have driven the production of creative content examples to showcase the technology. For example, one reviewer of the new headsets, Scott Stein for CNET (Stein, 2017), described the light field display, saying, "it projects what's effectively a full 3D image onto your retinas that can be focused on in the same way that a real object can". He said he was standing in a room, looking at a solar system projected in front of him, where he could focus on planets close to his eyes or on planets far off in the distance. This change from simple overlays on our field of vision to almost embedding information in our field of vision makes for a more immersive experience.

These recent developments in the hardware have opened opportunities to create a never-before-seen level of interaction between the artwork and the person viewing it. The technology has the potential to become an interface to artworks on display, unlocking their story which previously would only have been available in books, discussions and art history classes.

Utilising this technology, replaces the headphones with a headset which would allow for the audio tour to be added to by creating accompanying digital content which would enhance the experience. Analysis tools could be utilised by AR to map out areas of interest on the painting to show elements such as structure, composition and form, and the artists' use of medium to create areas of light and shadow to set tone and theme. Developments such as the light field display, wider fields of view, use of sensors, multiple displays, eye tracking, voice control, object recognition, scene recognition and hand gesture control are the features that brings this new level of interaction. These developments means there is a better quality of AR coming to market which means better user experiences can be created. For instance, analysis tools could be utilised by AR to map out areas of interest on the painting to show elements such as structure, composition and form, and the artists' use of medium to create areas of light and shadow to set tone and theme. Optional displays of contextual information giving insight into

the time of creation provide a greater sense of the thought processes underlying and the influences on the artwork. Suddenly, the audio tour has expanded to another dimension where more information is made available to users in a manner that does not overload them.

The technology that stands out the most with this new and improved AR systems are: the light field display, wider fields of view & eye tracking. Just a review of these can highlight how AR can be used to enhance guided audio tours in galleries and museums, giving visitors greater levels of interaction and a deeper level of understanding.

The light field displays have multiple focal planes, which give virtual objects a realistic appearance at various distances. For instance, an object placed in a user's immediate vicinity would be displayed in sharper focus than objects meant to be situated in the background. As a result, users can interact with objects and interfaces with more precision and observe the content with greater comfort to the eye. This makes the virtual information, less of an overlay and more integrated into the scene. So instead of it looking out of place it can blend into the view. A simple example of this would be the creation of a supplementary description plaque the could be displayed with the permanent wall plaque to give the user more information. Because of the placement and detail now achievable, the digital overlay could look as natural as the permanent plaque on the wall.

Coupled with this, is the wider field of view that is now available on the new headsets. This would mean that an interactive virtual menu and the supplementary virtual plaque would not hover in the users eye line and obstruct the users view of the painting. Instead, the plaque could be located in proximity to the wall mounted plaque and the menu below it or the painting.

Fig.1 Eye tracking can isolate areas and provide information about specific details.

The menu could hold links to different themes of information that can be displayed on the virtual plaque depending on the narrative as part of the exhibition but can include, bio of artist, explanation of the painting, social and political background which the painting was created against, who commissioned it, its place in history, techniques used, influences on the work, and how it influenced future work.Eye tracking has the ability to create a more intuitive interface. It can track where the user is looking and create a heat map of the painting that reads what the viewer is interested in. These could trigger point specific information for the user based on the parts of the painting they are looking at.

As per figure 1. these trigger points could relay information about the composition, the people, characters and or objects within the composition, the details within the visual narrative and painting techniques.

fig.2. Shows the variety of ways that the light field display can highlight areas of the painting to increase awareness of the area being discussed.

Figure 2. shows how these areas could be visually highlighted in a number of ways, from increasing the size of the area and showing it independently from the main painting or desaturating the colour of the remaining image, as it appears here on the left. Text or audio could be added to give more details about the highlighted section. Using the light field display, the section could be blown up to allow the user to view the detail, texture and brush strokes.

Just taking these three examples from all the new features showcases how they, potentially, are building blocks to a new user experience that could enhance visitors appreciation of the paintings on view and the exhibitions on display.

The last 20 years have seen a huge change in how people access information, which has had the knock-on effect of more people accessing it than ever before. Technology such as the internet and mobile phones have been a huge catalyst in this change in how people consume data. As we move forward so too does technology and the younger generations become more technically savvy. These digital natives will adapt to new

technologies faster and will come to expect to be able to use the different technologies when visiting art galleries or museums. AR is already revolutionizing education in industry and medicine. It is being utilised in retail to engage with younger generations. AR guided tours in art galleries and museums have the opportunity to change how people interact with art, history and culture and renew an appreciation across generations. Seeing is what you bring to it and AR can help to bring a lot.

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