University of Huddersfield Repository

Pande, Preeti

Creation of Educational 3D visualisations of a cultural world Heritage Site: Saltaire Case Study

Original Citation

Pande, Preeti (2011) Creation of Educational 3D visualisations of a cultural world Heritage Site: Saltaire Case Study. Masters thesis, University of Huddersfield.

This version is available at http://eprints.hud.ac.uk/id/eprint/17480/

Creation of Educational 3D visualisations of a cultural world Heritage Site: Saltaire Case Study

Thesis Submitted

By

Preeti Pande

MA Research

School of Art, Design & Architecture

University of Huddersfield
October 2011/12

Table of Content

List of Figures

Acknowledgement

I would like to thank my Thesis supervisor Dr. Ertu Unver, Andrew Taylor and David Swann for their support of my vision and guidance throughout my research. Their suggestions have helped me to shape the project.

I extend my sincere gratitude to Mark O'Brien for his continuous support and helped throughout the course.

I owe a debt of gratitude to the library staff at Shipley College and Huddersfield University for their support research.

My special thanks to my parents and family who have given me valuable support without whom I could not have pushed my boundaries so far.

I thank my friends for letting me know their view points and for their immense support.

Finally, I would also like to thank the department of Art, Design and Architecture, University of Huddersfield for providing me with equipments, models and other lab facilities to carry out the research.

Abstract

A world heritage site consists of cultural, archaeological and historic site which includes monuments, buildings, lake, forest and geographical structures as well as cities which have significance importance. UNESCO (United Nations Educational, Scientific and Cultural Organisation) believes that many Cultural and historic sites provide immeasurable benefits to mankind as they can be used to contribute the growth in tourism and raise the local culture hence it should be protected and maintained at all costs. This research describes a study, which aims to generate and visualize the creation of 3D Saltaire World Heritage Site involving models of historical building and surrounding place.

The study will explain the 3D Digital presentation of Saltaire structure and models of salt Mill, Saltaire church and village including environment.

This research describes contextual collaboration between history of Saltaire World Heritage Site and presenting it in Digital Design. The descriptive goal of this research is to identify and document the critical condition for the past of 19th century and present environment at saltaire.

1.0 Introduction

This research will be important for social interaction and can help to develop a sense of pride among youths. Through this project the researcher would be increasing public awareness worldwide which will help to preserve the site. The more we know about our past, the better we shall understand our culture and it will take further steps towards its preservation. This research is to create high quality 3D models to ensure that it provide the viewers to visualise the buildings developed in Saltaire during the period of 1850's. There are different aspects of this research first creating a realistic model of areas of this historic heritage site another to provide knowledge toward the world heritage site, which have lost its significance due to lack of awareness. This research will focus on the history and culture of 19th century to bring awareness so that our youth generations are familiar with this historic heritage site. This research describes the two main target group of audience. The first group is the primary Group which includes Students, Animators, Professionals and this group audience consist of young generations between 16 to 35 years of age. The secondary group consist of the Public Audience which includes Tourist, archaeologists etc. This Group of people includes between 30-50 years of age. The challenge to make people aware of this study would be overcome by presenting this project into a 3D Digital Animation video which would be accessible through a live website of Saltaire. These above strategies would also benefit the tourists for guidance. The resources collected and developed in this research will be archived at the Shipley College library which will benefit the Primary group of audience for reference and visualizing the scene of the historic Buildings.

Animation is always known as a medium to convey message. Since the time animation started, people have tried to capture a sense of motion in their art. Animation describes as graphical representation of drawings to show movement within those drawings. Simply watching an animation or real time simulation is a passive method of interaction, a more immersive user experience is obtained through the active exploration of the artefacts. For this, it is not only necessary to create 3D scene but also to add realism to it by including the environment. It's necessary to develop new ways of displaying the world heritage or monuments either by visiting the actual site and gather information about past or by displaying the monuments, world heritage site or cultural heritage through short films or visualise through videos.

1.1 Aims & Objectives:

- This Research will deal with advanced methodologies for 3D modelling, animation theory and principles, focusing on animation of historic sites including with water and smoke effects to create realistic look. It will help to achieve fluent awareness of the subject and the wider picture, and to able to communicate this effectively.

- Acquire and apply advanced animation and Digital video production editing skills used in animation industry and apply these techniques in this project.

- Acquire and demonstrate an informed understanding and appreciation of the Historical development of animation in games industry.

- Develop and demonstrate different skills and technique associated with game development and Digital Design field.

- Research into pre and post production processes used in Video Game, Film Industry and architecture animation.

- Demonstrate a critical knowledge about cultural and ancient heritage and articulate this through the methodology techniques.

2.0 Literature review

One of the primary goals of this chapter is to review about the previous research work on Architectural Design and Historical Animation with relevant tools and techniques involved in 3D modelling. Brief descriptions of heritage representation and research on Digital technologies have also been reviewed. A wide range of theories has evolved which have tried to locate to develop a full understanding and analysing of cultural artefacts and Historic site through critical review. Basic understanding of archaeology and vitally necessary methods used to analyze history of archaeology for historical information preservation will be carried out. The purpose of this study is to examine the strategies involved in allowing the public to connect with the Historic World Heritage Site and action taken towards its preservations. This chapter explains about the Relevant past research followed by a brief description about architectural design and animation in chapter 2.2. Chapter 2.3 describes the technique and development tools and chapter 2.4 focuses on digital review of World heritage Site.

2.1 Review of Relevant Past Research:

There are numerous examples of work and research carried out on cultural and world heritage site and work have been developed in architectural and archaeological field. Archaeology refer to broad study about the past and human society for recovering and analysing the culture and environment data which are left behind or lost that includes artefacts, architecture and cultural landscapes of historic site or world heritage site. Elizabeth Syfert (2006) in this thesis has studied, identify and effectively document the 20 type of Ohio stone used in the building. The study survey the present condition and critical properties of the stone through GIS (Geographical Information system) software and evaluation have been done on the critical property data and current condition data into GIS in order to accurately diagnostic assessment of the stone in the Ohio house, whereas 5 factors explores the effecting condition which are drawn through field survey and further conclude that this study will serve as a useful foundation for the Fairmount park historic preservation trust in developing an effective program for the stone in preparation for restoration of the Ohio stone. Pourafkari (2007) - this research will evaluate Iran's potential in the tourism industry and cultural tourism development comparing it with turkey because of their similarities in culture, attraction and religion. This research has examined cultural tourism resources in turkey and Iran both has almost same resources with similar culture and tradition. The object of the research was to evaluate the accelerating and decelerating factors in cultural tourism development in Iran and turkey. The analysis is based on information gathered through electronic data, discussion with heritage tourism managers and stakeholder's workshop. The research concludes that funds are needed for setting up special unit for safeguarding cultural heritage as well as for establishing the research centre for cultural heritage and studies. The fund could also be invest for advertisement and marketing of Iran's tourism and cultural attractions and potential at the global

level leading this as an integrated part of tourism development plans worldwide. To accomplish the purpose of this research is to help the users to understand the importance of cultural and historic site. The other objective of this research is preservation of current historic site for future generation with the help of some steps and technologies involved and representing these ideas through exhibition. The primary target audience of this research includes students age between (18- 35) this is also of interest to game developers as this thesis will intend not only for current but also next generation games. However there is no exploration of Industrial Historic research for the period of 19th century. Previous research has been performed on different Digital Historic and World Heritage Site which have been explained further in chapter 2.4.

2.2 Architectural design and Animation:

Architecture Animation and Design industry is a well known industry providing services throughout the globe with the expertise from 3D Animation, visualisation providing a 3D sight of the relevant objects as per the demand of the clients and customers. This industry involves the work of interior design, clients such as builders, contractors and designers. Producing 3D rendering models helps the builders to grow their business as they need to create a proposed interior structure for the buildings or offices and the Architecture Designers or 3D artist developed the interior designing of these building or office which helps the customers to have an idea about what they would like their home or office to look alike. It can be provided either in a series of images from different angle or through videos which will visualise the surrounding with the help of capturing the movement by camera. It's an advance technique that allows viewers to see the elaborate details about the building materials. The environment, landscape, also includes lighting, trees and roads to provide a realistic look.

There is an expanding market for architectural animation and design as more real estate developers and architects are including these techniques in their marketing plans. These animations are used for residential building such as houses, apartments, Farmhouse, Complexes and also Commercial Applications such as Companies, Offices, Educational Institutes, Hospitals, Medical Virtual tour, shopping centres, restaurants and hotels including creation of their surrounding environment. Animations create a lot of impact on the client by viewing the description of the building in 3D animated videos rather than oral description or by a drawing format. Restoration of cultural heritage and ancient architecture is another sector using architecture animations to digitally preserve their culture historic site for educational use. [PB07].

2.3 Technique and Development Tools:

This research topic consists of documenting the historic cultural building of Saltaire in a 3D animation. It contain different kind of series of still images, when these images are assembled or played together it form video visualisation which are presented with different

camera angles, for further enhancing the surroundings with help of 3D walkthrough which will give the project a more realistic look and easy accessible environment.

2.4 Digital Review of World Heritage Site:

This chapter will review on previous work done on Cultural/ Historic preservation and archaeological site. The virtual reconstruction of the Hagia Sophia is used as a museum at current period as it has also been used as a church and mosque at different periods in history. This work shows the progression and changes to the architectural construction and decoration during those different periods. And the exhibition developed for Virtual Time Travel in Istanbul comprises character simulation of the Namaz pray. [FPM02].

The Deep Map system, [MZ00] is able to generate personal guided walks for tourists through a city. It takes into account personal interests and background of the tourist when generating the tour. [LS03] This paper, display the augmented reality technology to present an archaeological site inside the "Virtual Showcase". A scale model of the ruin of the roman "Heidentor" is complemented with virtual overlays to provide the visitor with additional information about the exhibit and interact with it in various ways. Demonstrating custom authoring framework, complex interactive presentations allows visitors to explore story about the history of the buildings. [ZCG05] This research has described a method and an application, ArkVis an application that provides an easier way to cognitively merge multiple data sets that represent different periods in time. After importing and entering minimal information a scene can be navigated arbitrarily in time and space. By controlling the time window, this animated time window has provided the progression of time at archaeological or cultural heritage site and allow user to visualise the site at that period of time. [JR03]This paper displays the historical site Mandu situated in Madhya Pradesh India which was presented through compatible interactive museum/kiosk structures which will have access to a multi-media database containing sound and imagery from heritage sites around the world. These scalable structures will permit people of all nationalities to experience world architecture, culture and history while at the same time can also serve as promotional tools for enhancing heritage tourism and cultural awareness and education. This research uses similar approach but involve different other options of presenting the Saltaire World Heritage Site. Digital preservation is really important especially for world heritage sites as due to today's change of climate and weather conditions there are huge impacts on the heritage site such as fading the original texture of the wall. To maintain the originality of the buildings and historic data government needs funds for maintenance. Preservations is possible when people are aware of the situation and this and to fulfil this task the researchers goal is to bring awareness to audience about the heritage site in the form of 3D Digital animation. This is not the first attempt to create cultural Heritage with the help of computer graphics perhaps the researcher is taking further steps to create it more realistic and that can be used for education purpose and should be informative for the audience. Though details of saltaire are also available in the form of drawing and paintings which are considered as arts, but presenting them with the help of computer graphics will be useful for digital preservation.

3.0 Review of Tools and technology used in Heritage Visualisation

This Chapter will explain about the different Software and tools involved in Animation Industry. Along with the software which were involved in this study.

3.1 Software Tools:

Animation Industry works on various different software that are available for Digital Artist and Designers. These Softwares helps to achieve the designers their task and goals for designing. To accomplish the task there are number of software available for animation and designing. One of the factors that will effect our decision depends on the type of animation we want to tackle. Commercial software packages such as Maya, 3D Studio Max, Cinema 4D or light wave are very complex programs mostly used for animation. There are few lists of software and their feature mention below which are used by Animators and have been involved in this project by the researcher.

3.1.1   Maya:

"Maya is 3D software which includes creative features and tools such as Modelling, Animation, Rendering, Simulation, Visual effects, and compositing and a high level production" (Maya Autodesk). This software is used in movies, television, advertising, Architectural Animation, and graphical Design. Many CG characters in movies are created with the help of Maya software such as Gollum from Lord of the Rings, Na'vi from AVATAR and Davy Jones from Pirates of the Caribbean. Maya is a tool which animators and visual effects could use to achieve previously unattainable levels and creativity.

3.1.2   3D Studio Max:

Autodesk 3D Studio Max software is used for modelling, texturing, Lighting, Rendering and Animation. Autodesk 3ds Max is one of most powerful 3D design software used especially in Modelling for low polygon for video games industry. It also include some useful particle features like fire, water, smoke for Video game and architecture industry and further can be used on various different projects. It also includes tool such as reactor which is a very useful tool used to animate

through virtual characters. "3ds Max Design uses leading game technology to help provide you with a higher fidelity preview of your materials and lighting in the viewport prior to rendering. This enables you to make interactive decisions in a context that more closely matches the final output, helping to reduce errors and enhance the creative storytelling process" (Autodesk 3Ds max). Texture Assignment/Editing used for texturing, Skinning the Skin or physique modifier used to control skeleton deformation, to move the character smoothly as joints move. Additional modifiers such as skin wrap and skin morph are used to drive meshes with other meshes to make weighting adjustments. Bones for the characters can be rigged using IK solvers. An addition cloth modifier tool enables the user to turn almost any objects into cloth and helps to create the garments from beginning. Whereas the latest version of 3D Studio Max also features shaders as ambient occlusion and subsurface scattering, particle system, radiosity and normal maps creation for rendering, dynamic simulation, global illumination and customizing its own script language.

3.1.3   Photoshop(Texture)

Photoshop is a leading image editing application used by various graphic designers, visual communicators, print designers and photographers. Photoshop involve basic functionality many features which are useful, few of the main features are Selection, cropping, modifying colour and effects, layers, text editing, Gradients(introduce flashy, eye-catching graphics in your pages). It Process raw images, JPEGs, TIFFs, or PNG images with the industry-leading Photoshop Camera Raw 6 plug-in. Photoshop is also used for editing textures for animation. The researcher has used Photoshop for editing the wall textures which have been downloaded from the internet.

3.1.4   Adobe After Effects

Adobe After effect is the leading industry solution software for creating motion graphics and cinematic visual effects. This editing software during this research have been implemented for editing the Saltaire video to give a realistic look from adding the title and text, as the video is demonstrating the 19th century animation of buildings and houses created in Saltaire during the era of 1850 hence, to make familiar about this buildings to the audience text messages have been displayed providing a small details and background history of the buildings, so that the viewers can understand what they

are watching. As the video will displayed the houses which were build in Saltaire the text will indicate and display when the houses were build and a small description for the year and the purpose the buildings were created.

3.1.5   Interactive Digital tools

Interactive visualisation is division of graphical visualisation which involves studying of human interaction with the help of computers to create graphical visualisation of information and through which different ways this process can be present in an efficient manner. The requirement for the Interactive software is driven by the increase the demand of 3D visualisation, special effects commercial, interactive game production and different other industries. "Unity is the development tools designed to create interactive 3D games. It is the fully integrated development engine to assemble high quality and high performing content. Unity assemble the assets and environment, simultaneously developed, edit and play the game and once ready publish it to different platforms such as desktop computers, web, Xbox, Wii, PS3. The biggest advantage of unity is it the complete tools and workspace helps user to reduce time, efforts and cost of making games." (Unity Technologies).This project have developed the basic phase of saltaire in Unity tool and further could be developed with the help of team to be further used as background for game production.

3.1.6   Dreamweaver

It is a web development application created by macromedia and now developed by Adobe systems. It allow user to build website which we browser on Internet. Dreamweaver used third party Extension to extend Core functionality which any user can write in JavaScript or mainly in HTML. Dreamweaver supports many different syntax highlights such as Action script, CCS, VBScript, PHP and many others. The use of Dreamweaver in this research will help to create a website for the Historic site displaying the information to user which would be easily accessible. It would also display the animation video of Saltaire and few video relate to the World Heritage site.

Basic images have been downloaded from website and with editing the images and text in Dreamweaver the website have been created. The first process was collection of data such as images and once all the data have been collected the next step was to import these data in Dreamweaver and

set the project and edit the images in Photoshop. This was done by opening a new HTML template in dreamweaver and adding the images which done from selecting the tool Common – Insert Images from the box will select the source from folders where data are stored. Resizing the images can be done at the bottom there are tools which are available to edit the images text, alignment and so on we can link the design to covert it into website at the bottom starting with "http" and website name. There are 3 main tools such as Design what users see on the front page and Code displays the coding done on website and Split include the coding at the top and design at the bottom to make it easier to work. Once all the design and coding was completed using HTML. And once the web hosting is done the website was completed. The next step was to make it live access on the Web.

4.0 Case Study: Saltaire World Heritage Site

This Chapter will explain about the background history during the period of 19th century which will explain about the Saltaire village, Sir Titus Salt and will provide with the research on Manufacturing of road, stone, environment conditions machinery and economic condition for the period of 1850's. This Paragraph will explain about the background history about Sir Titus Salt the founder of the village Saltaire and the establishment of the village Saltaire with description about formation of the village.

4.1 Background Study of Saltaire.

4.1.1 History of Saltaire and Sir Titus Salt

Sir Titus Salt:

Sir Titus Salt Who was the founder of Saltaire village and establisher of the Salt Mill was the son of Daniel Salt who was a wool stapler born in Morley near Leeds on 20th September 1803. He went to Heath grammar School and after completing his studies he worked at Wakefield wool stapler for two years and later joined his family firm in 1824. Titus Salt married in 1830 to Caroline Whitlam, he had a happy married life with 11 children's sadly 3 died in infancy. When his father Daniel salt retired in 1833, Titus took over his family business and within twenty years he expanded the business and

became the largest employer in Bradford. He was known with a man of vision of an industrial place and by building the Salt mill and the village he brought his vision to life. Titus had been involved in politics and also supported many charities. During the period of 1840's Titus was running five mills and was very wealthy and had those means to provide healthy life for his workers who were living in bad and unhealthy conditions. In the year 1848 Titus Salt became the mayor of Bradford and the Bradford textile industry was blooming. A few years later Salt bought a land three miles away from Bradford and created a new mill known as Salt Mill.

Later he developed the village near the mill for his workers to provide them healthy living conditions with fresh water including gas supply and sanitation and this village was name as Saltaire which is a combination of his name 'Salt' and the river 'Aire' situated near the mill. Saltaire also had park, school, church, library, hospital and different shops. The title of Sir was given to Titus Salt by Queen Victoria in 1869. In 1876 the last building of the village was completed and few days after the Christmas salt died at his home at the age of 73. One can find a statue of Sir Titus salt in Robert's park and the village he created behind him.

Figure 1: Sir Titus Salt

Figure 2: Aerial view of Saltaire

History of Saltaire:

Saltaire village is situated near Bradford in West Yorkshire (England). The village was developed by Sir Titus Salt between 1951 and 1876. Workers at salt mill have to travel from Bradford to saltaire each day for work and hence considering this Sir Titus salt developed a village with houses for their workers who was employed for him. The Almshouses for people where situated near the Railway Station. The railway station was build in 1856 as part of the recently opened leeds-skipton station line was closed in the early 1970's as part of Lord Beeching's axe and was reopened in 1984. The salt mills, the village and the station was designed in an Italianate style by the architects Lockwood and Mawson's and William Fairburn was responsible for engineering work for the new Mill. In 1853 the Salt mill was towards completion and the huge machinery was almost set up. Mr Salt celebrated his fiftieth birthday on 20th of September 1853 and that was the day when the steam powered Salt Mill

was inaugurated and went into production and manufacturing. It was the biggest factory in the world at that period of time. There were around 3000 workers employed producing around 30,000 yards of alpaca cloth every single day. Later Saltaire was developed further by building 45 almshouses for the poor, a town hall, library, schools and various other municipal building which are centred on Victoria square. The square also has carved sandstone lions at its corners. It also include the Beautiful Saltaire United Reformed church which was built in 1859 and well designed by the architects not only the exterior but also the interior. During 1853 and 1870 salt invested thousands of pounds into workers housing and public buildings. Salt Mill made a lot of profit in the textile business and another mill was created in 1884 on north side of the first Mill. In 1857 he was President of the Bradford Chamber of Commerce, and served as Member of Parliament for Bradford until he retired though ill health on 1st February 1861. Salt died in 1876 and was given a civic funeral and the mill workers made monuments in his memories [FIR01]. Salt mill Closed in 1986 and was purchased by Jonathan Silver and began renovating it. Today saltaire is used for residential, commercial and business purpose. Several large room of the Salt mill have been taken over the Bradford born artist David Hockney[1] displaying the 1853 gallery including drawing, paintings and posters.

4.1.2 Industrial Surroundings of Saltaire

During the 19th century the Roman Empire maintained 53,000 miles of roads, which covered all of England to the North. Many of their original roads are still in use today, although they have been resurfaced numerous times. During the 19th century there were improvement in the roads as to carry those sorts of vehicles and heavy traffic which resulted in the era of the turnpike trusts a new way of getting the road built and maintained. There were group of people who would get together and ask permission from parliament to build a section of road. [SS11]. People using the roads had to pay tolls and those funds collected from tolls were used for maintenance of the road. The digital animated video presented by the researcher also features the road used in the 19th century at saltaire. Fig. 3 displayed the Victoria road which is the main highway of saltaire as it passes salt mill and passes through the cast iron bridge (demolished in 1962) which carried the road across the river Aire to the park, and beyond to Shipley Glen. [FIR01]. Fig.4 displayed the image of road of the 21st century.

---

[1] http://www.hockneypictures.com/illust_chronology/illust_chrono_01.php

Stone were mostly used during the 19th century. Later by the twentieth century the work of quarrying stone and brick making had been declined, as the growth slowed and new technologies were implemented. The construction of the mill buildings of saltaire, houses, church had been build from stone mainly carved stone and sandstone which is a sedimentary rock made up of mineral calcite, it is a soft rock. Fig. 5 shows the yellow line stone surface similar colour stone have been used in building the Salt mill at saltaire as stone been recognised as durable material.

Fig. 3 Victoria Road in 18th Century

Fig.4 Victoria Road in 21st Century

Fig. 5 Yellow-limestone surface

Fig.5 Stone used on Mill

Fig.6 Texture used for Houses
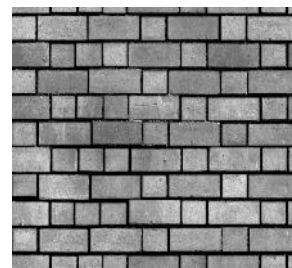
Fig7. Texture for chimney

Stone textures have been used for creating the 3D Digital models. The figure 5 shows the stone which is used for the Salt Mill as it was created with lime colour stone. The mill used for industrial work of producing cloth was beautifully design by the designer Lockwood. Figure 6 shows the texture which have been applied for the houses, which was build for the workers, it's a similar texture used in Saltaire which was imported from Google search that was used in 19th century. The next images shown in figure.7 have applied to the chimney where the smoke used to generate from

the Mill. As there was smoke above the chimney and hence this was suitable texture as due to smoke produce from the mill.

4.1.3   Environment Condition of Saltaire in 1850's

The living conditions of the workforce were very bad and the life expectancy for both men and women was little over twenty years, in a town recognized as one of the most polluted in England [CHR09]. Bradford was known as the most polluted town in England due the black sulphurous smoke that developed from the factories work and had bad effect on the health of the people living there. Cholera was a disease that came spreading from India in 1830. More than half of those people who caught the disease died and only 30% of children born to textile workers reached the age of fifteen. It had spread through the water that had been contaminated by the germs of those who already had the disease.

The working condition in Saltaire was poor and very dangerous. Smoke and pollution emanated from the factory chimney which was dangerous to health, Salt attempted to cure the problem and clean the pollution using a device known as the 'Rodda Smoke Burner', but with only a limited degree of success. In exasperation at the enormity of the task, he decided to build the village, where the factory chimneys were designed to reduce pollution and the streets and houses were built to provide a comfortable environment for the workers of the mills [WAR06]. Bradford's sewage was dumped into the River Beck. As people also obtained their drinking water from the river, this created serious health problems. Life expectancy was just over eighteen years and was one of the lowest in the country. [SJ03]. The working condition in Saltaire was unhealthy and very dangerous as workers worked arduous with looms in noise. Workers had to work for long hours and were paid very little. And even the living conditions of Bradford's employers at that period had become so bad that Bradford wool combers actually organised and published their own reports of insanitary environment in which the employers lived. Titus Salt was aware of this situation and hence considering their living condition Titus Salt created village for the employers who worked at the mill. The village had 775 houses on 22 streets with most of the streets named after his family members.

Figure 8: Bradford, c.1840

4.1.4   Machinery in Textile production in 1850's

The introduction of small hand-operated spinning frames and the scribbling machines during the later part of the 19th century increased productivity within the woollen industry. The scribbling machine performed the work of several hands operatives and was well suited. Some of the bad effects on the workers were the sound generated by the machine. Heavy machine running in the mill and the electricity was generated with the help of steam turbine[2] during that period and this resulted in bad effects on environment as steam are mostly raised from burning coal, oil gas in a combustion chamber and this chemical process of burning the fuel generate heat which result in high temperature effecting the environment. There were no safety policies for workers working on these dangerous machines. Though it's stone construction of the building, stone floors and internal cast iron pillars made it fireproof as possible. But the noise of the machines was deafening. Children above 7 years of age also used to work in the mill. But the reform that was passed after the year 1833, changed the rules for working hours for children, one of them included that children age (9-12 years) should not work more than 48 hours per week or 9 hours per day. And Titus Salt was the first person to implement that children should not work more than 9 hours a day. A gas works was built between the canal and river which supplied light to the mill and later on to the town. The houses were lit by gas situated on downstairs from the mill gas works, but during nights the occupants had to use candlelight. There were huge and heavy machinery used in the Salt Mill which used to manufacture cloth.[FIR01]. Salt Mill was the biggest textile industry during the 19th century and huge and heavy machinery where installed for producing and manufacturing cloth. The important machines used for producing cloth used at saltaire during 1850's are stated below. The first Figure 9 shows the spinning machine used at Saltaire which was about 630 feet in length installed in a single room having 16,380 cap spindles and known to the operatives as the 'Lobby'. The machine displayed in Figure.10 was the dye house where white pieces were brought up to the required shade. George Armstrong and his fellow workers used to work in the unhealthy atmosphere of the dye house at Saltaire as there were no safety policies. Figure.11 shows the picture of weaving machine, the weaver fixes a pirn of weft into a shuttle these were boat-shaped contraptions hanging from the side of the loom. The next image shown in Figure 12 Showcase the machine used at the finishing department, this is where the cloth went through a variety of process including drying, cropping, blowing, shrinking and pressing. The Finished pieces were checked for faults and for correct shades, rolled up wrapped with paper and made ready for dispatch to the customers.

---

[2] http://www.mpoweruk.com/steam_turbines.htm

Figure 9: Spinning Machine Saltaire, c.1947

Figure 10: Dye house Saltaire c.1930

Figure 11: Weaving Machine Saltaire, c.1945

Figure 12: Finishing Machine Saltaire, c.1950

4.1.5   Economic importance of Saltaire for Textile

Saltaire was known as the successful Industrial Village with the expansion of the worsted trade with increase in the population from 16,000 in 1811 to 103,000 in 1851 transforming it from a little village to the worsted textile capital of the world. [FR01]. Titus Salt pioneered the development of innovative worsted fabric and other fine yarns from a combination of alpaca and wool. Saltaire owes its existence to salt's own first hand experience of working and living in Bradford between 1822 and 1850.

[SJ03] During the 19th century, Bradford was a small rural market town, where wool spinning and cloth weaving was carried out in farms and local cottages. The Industrial revolution increased with rapid growth, with wool being imported in vast quantities for the manufacturing of worsted cloth as Bradford as being specialised in this sector. By 1842 there were around 38 worsted mills and 70 borough and was estimated that two-third of the country's wool was processed in Bradford. The industrial growth of Bradford attracted the workers for jobs in the textile industry. Daniel Salt was one of the industrialists who started a business as a wool stapler and his son Titus Salt took the business further. He bought Donskoi wool from Russia, but was not able to sell as it was difficult to process the tangles fibre. He bought his own mill and began to spin the wool himself. His mill prospered and Titus salt was able to afford to run four more mills in the town. Salt's mill continued its textile manufacturing for almost 130 years and provided livelihood and accommodations to the workers for around five generations and left a heritage whose importance is now recognised as a World Heritage Site.

Saltaire Site Analysis

This chapter will explore information about the site analysis of saltaire. The information gathered through this site, contemporary records and collection of data have been discussed and explained below.

4.1.6   Site Visit:

Saltaire is a Victorian model village within the City of Bradford Metropolitan District, West Yorkshire, England, by the River Aire and the Leeds and Liverpool Canal shown in shown Figure 13. Saltaire combined of a "model village" and an attraction with two textile mills and a village build for workers. There is a station built here when the Mill opened to enable the workforce to travel from Bradford and other centres before the houses in Saltaire were built. Figure 14 is the image of the saltaire station, near the station on the George Street there is a Dinner Hall on the opposite side of the Salt Mill displayed in Figure15. Next to it is the United Reform Church (previously the Congregational Church) which is the listed building and it is still a working church shown in Figure16. Saltaire had 45 almshouses for the poor, a town hall, library, school and various other municipal buildings, which are centered on Victoria Square. The square has four designed carved sandstone lions at its corners shown Figure 17.
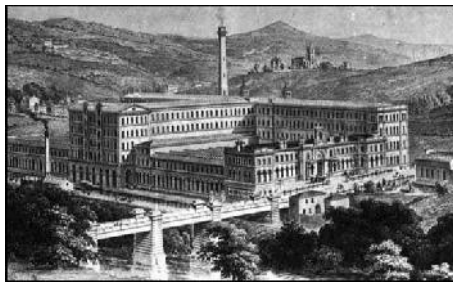

Figure 13: Salt Mill Saltaire c, 1850's

Figure 14: saltaire Station c, 1847

Figure 15: Saltaire dining hall

Figure 16: Saltaire church   Figure: 17 Sandstone lion

4.1.7 Contemporary Records

The researcher have been to the UNECSO Saltaire site and also visited the Shipley library and Huddersfield library to search for the relevant information such as portraits, articles, photographs from the archives. The images below displayed the cloths that were produce during the 19th century from Salt mill collected from the Shipley library with the help of the photographs. The figure 18 shows the textile material (cloth) produce from the Saltaire mill. And Figure.19 is the sample of check which was paid to the mangers working for Sir Titus salt during 19th century.

Figure 18: Textile Material

Figure 19: Cheque used in 19th century

4.1.8 Collection of Data

This research has been processed through two steps, primary as well as secondary sources of data collection techniques that were involved to undertake the research. First step involve collection and analysis of gathered data to create the digital animation which was achieved with the help of referencing the collected data. The next stage involved examination of the detailed information about Saltaire including map, old photographs, books and article published on Internet. Once data were collected, implementing the digital animation using the materials and procedure of the official websites, case studies and other publications were carried out. The second

step includes the survey and numerical analysis of the results generated from the survey conducted online about the creation of 3D digital Animation video. The data collected from the survey was stored in a Microsoft word document and later added to the research Appendix D.

5.0 METHODOLOGY

Ancient Culture helps to understand about our past history as this study is part of our tradition and of intellectual development. The research aim is to examine strategies involved in allowing the public to connect with the Historic World Heritage site and familiarise them with the process taken towards preservations. Cultural heritage is to keep the past bestowed in present and saved for future in other words conservation of tangible and intangible artefacts. Digital techniques provide preservation of artefacts and also validate memories. The negative impact on the heritage site is the climate change which will have a profound effect on the historic site in future. It may affect the appearance of the sites when viewed by future generation who would not be able to see the past and current condition of the site which may change when viewed by next generation. This research intends to raise awareness and support for historic preservation which deals with archaeological sites and historic site.

This research also conducts education approach for digitalized access of cultural heritage, providing informative data. It would further contribute to National and local community and to sustain the economic development. Yunnan Province (1999) states "Authenticity is an important element in sustainable historic preservation based success". Economic development can be undertaken by identifying economic development strategy, such as identification of historic resources, enhancement of opportunity for tourism as it is the fastest growing segment of the world conservations of major landmarks, monuments and historic site.

It can be undertaken by presentation to future generation. This chapter provides further details by gathering the research questions which are (a) Evaluating some steps and technologies one can use to preserve the WHS for future generations? (b) How would this technique contribute to the target audience with the help of Digital design procedure?

5.1 Digital Design: 3D Modelling of Saltaire

Digital Design involves a wide variety of computer related skills such as 3D modelling, Digital Imaging, projects in Web Design, which can be expanded further as Graphical Design and visual media. Using specialized computer programs digital designers can create a single draft that depicts every function, layer, and perspective of an item to create it into a full fletch

animation. Digital design is a form of communicating virtually with the audience which can be achieved through films, video and can be presented with the medium of mobile, kiosk, museums and exhibition. It's an easier way to convey our message to the audience and can be produce entertaining and education videos.

5.1.1   Introduction

Digital design is one of the largest sectors in the United Kingdom and it has a huge impact on architectural industry. This research documents the review of principle and practice of digital design including the existing digital representation of Heritage site. This Chapter describes the data and surface modelling techniques, approach to design, phases of design and modelling with description on the process of editing. This part of research aims on the design process studying about the Heritage site and having a brief synopsis of past Digital Heritage Site development. Different approach has been evaluated and methods were developed on the basis of this research. A few sketches were developed in the form of story board and further modelling was implemented according to the research.
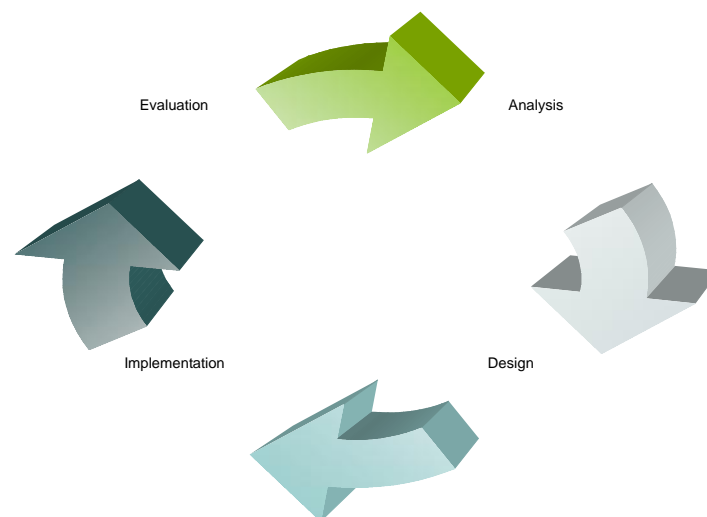

Figure 20: Phases of Design Diagram

5.1.2   Approach to Design

Considering the various world heritage sites around in UK, the textile industry is the most important and growing sector. Various textile industries are localised within the UK which is often related to the historical roots. Saltaire was chosen to be presented in digital form to produce a 3D digital video for the reason as it has one of the most successful textile industries of the 19th century and now known as the famous historic site situated in England. The digital design of Saltaire work started with a brief research on the history by the researcher and once analysing the important aspect of the site was completed. Pre-production phase of design such as sketches and storyboard development was performed. Designing this archaeological site will provide extensive

insight on the Heritage Site by Narrating and filming. The researchers approach for creation of 3D models of saltaire consists of following steps:

- 3D modelling of Saltaire building and surroundings.
- Visualization of 3D building for saltaire.
- Another way of Marketing for tourism.
- Easy accessible to users surfing Internet, mostly young audience.
- Huge potential and eco-friendly for educational.
- Preservation of Digital Data in form of CD/DVD's and websites stored in National archives.
- Digital Animation will be archived at library of Shipley for further research and reference.

5.1.3   Phases of Design modelling

There are mainly three Phases of design involved in this research, the first research phase consist of Analysis which included background research and identifying the needs of heritage. Research Phase two includes the Design and development process such as Concept sketch and design development, completing the 3D modelling of saltaire site, texturing, lighting, animation and rendering process. And the research phase three will finalise the design of the 19th century as well as 21st century, Adding realistic environment like trees, cloud, smoke and other additional 3D objects for transportation. Below there are description about this three different phases.

5.1.3.1   Analysis

Analysing is the first step which starts with a research on the creation of 3D Digital Animation. This project will focus on data analysis through evaluating and understanding the importance of saltaire and collecting data through photographs, books, internet, paintings and posters. Reference image use for modelling has been collected from the site visit and internet. The next step was to examine the details in order to discover the essential features such as important and relevant building required to be added to the animation and later it was converted into 3D models. Figure 21 shows the image referred for the canal water and figure 22 shows the train station model.
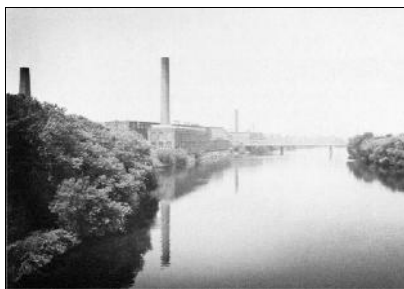

Figure 21: Canal Image, c 1850

Figure 22: Station and train model, c 1850

5.1.3.2   Concept sketches and Design Development

Once the past and the present relevant images and photographs were analysed the next step was to work on the concept and developed the sketching and storyboard. The further step was to start modelling of 3D Buildings at saltaire. This phase is also called planning and production phase which deals with working on how would this 3D Digital design work should be accessed and further available and used as a game. There are Different concept that are introduce and implemented according to the type of game and basic layout for the game. All the research and the planning get to a point to start the production stated by [WA10]. Different approach was evaluated and considering the methods that were chosen were decided to practised and implement it based on the research approach. Concept design was decided by finalising and selecting the most important building and surrounding to be displayed in digital design, whereas Sketch design was performed to finalise the idea before entering the modelling phase. The concept of the researcher is to create a digital library available online to public which includes resources containing information sheets about Salts Mill. The library will cover different range of topics related to Saltaire, History of salt mill, the environment, the work and the original model village of Saltaire. It can be accessed with the help of a website and further audience can have a copy of the Saltaire 3D Digital Animated video which would be available for further research and knowledge by accessing through the website and can be downloaded in a PDF format from the website, further information would be available through contact form on the website or email. It will not only provide information to tourist whereas also guide them with relevant information. Publicly available resources providing guidance about history site will generate excitement to visit the site especially International tourist and this will enhance the tourist business. At the same time it will also educate the students as they are major target group watching animation. Therefore through this research educating the audience about Saltaire Heritage Site would benefit the student and the visitors to gain knowledge about the site. Different sketches, drawings and final Story board (Annexure B) was developed.

Creation of Sketches:

Before the development of design initial sketches was developed, Sketches helps to develop an idea and use it later to develop graphical and digital work. Once the sketches were completed the next step was to study it in details for any further changes or development involved in the final results. Hand-made sketches were carried out using the HB Mechanical Pencils and further enhancement was done using Prisma Colour pencils to give it a realistic look. Further with the help of these sketches storyboard was developed to finalize the development of the storyline and which help to visualise the ideas and animation. Completion of the storyboard leads the research to the development phase also known as production Phase.
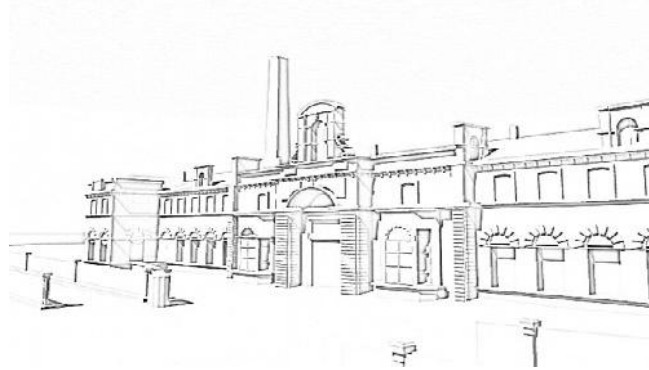
Fig.23 Saltaire church   Fig.24 Salt mill

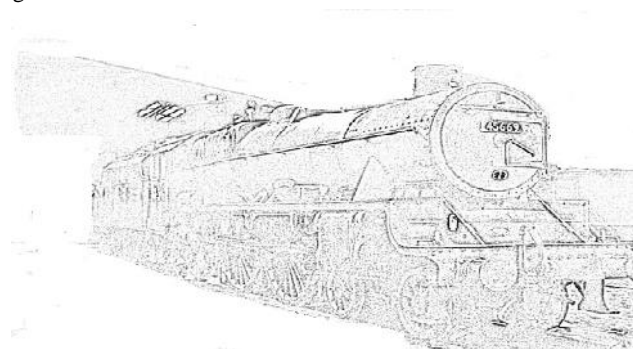
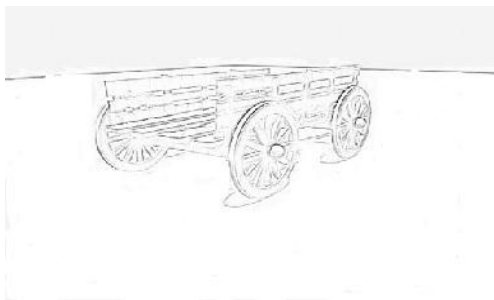Fig.25 Saltaire station c, 1850   Fig.26 Train model

Fig. 26 Cart used for travelling and transport

Once the Concept and sketches including the storyboard was created the development of digital design such as Modeling, texture, lighting, Animation and rendering was carried out based on the guidelines produce during the Pre-production Phase. The first step involve in production is modelling, once all the reference were gathered the modelling process was implemented.

The Next phase consists of creating the 3D models in Maya. This study also describes the comparison between the 19th century and the 21st century as preservation of saltaire heritage site will educate the user and explain them about the past as well the present period. Modelling is a process of creating models from an object such as polygon primitive, Nurbs primitive and Subdivision toolsets that includes cube, cylinder, sphere and many other tools which are involved in a process of developing a model by using the three main move, rotate and scale tool. There are other more tools on the menu bar one of the important tool frequently used in this Digital design is the extrude tool for developing models. Once an animator is familiar with the tools it's an easy task to create models.

Polygon modelling is the basic fundamental form of modelling used in 3D software. Surface modelling involves asset of surface to define face of 3D objects. There are different modelling techniques available in a Nurbs based animation like extruding, revolving curves and lofting. Using this technique gives the user the flexibility to model and design. Surface modelling is user-friendly specially the edge curves which not only let us create a free-form shapes easily whereas it's a good way to build models. The modelling process started with referring the story board. As this project involves creation of historic building so the basic techniques have been used such as the Salt building have been created using the polygon cube and to re-shape and develop the cube into a Salt Mill model extruding primitive tool have been used frequently and shaping the model by co-ordination with the help of scale, rotate and move tool. Same technique has been applied for creating the house, saltaire church, the Station and the Train.

The models of Saltaire were developed in three stages. The first step included developing all the 3D models. The Buildings were developed with polygon modelling tool using the basic features like extrude and scaling to adjust the objects according to the shapes this followed with the houses creation on the opposite right side of the mill and opposite mill the dinning hall building were developed. Later the railway track and the 19th century train were model comparing the actual current transport from car with the previous transport of train and cart. The second step was developing the surroundings which include adding the ground, road, fencing and canal, which were developed in Maya. The third and the last step included the environment few trees were added through image and some by visor window. To give it a realistic look sky were added in Maya. The water colour was change to dark colour rather than blue as the water in Saltaire in 19th century was very dirty as due to the bad conditions and water used in the industry. The 3D Digital animation presents the Salt mill which was the biggest textile industry of 1850's producing and manufacturing cloth shown on figure.27. Similarly Figure 28 display the current period of salt mill presented in the Unity software. Mode of transport has been explained in this project used from 19th century comparing it with the current transport of 21st century. The transport used during that period was train shown in figure 29 and cart which were pulled by horses, it was used for travelling as well as delivering goods, whereas the basic current transport at saltaire are car.
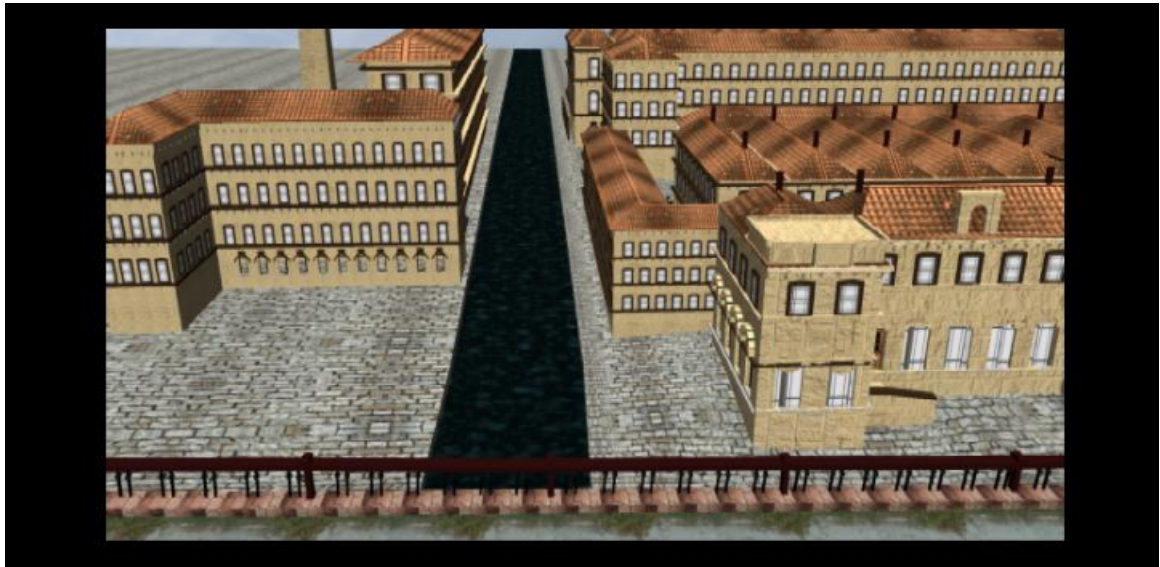
Fig. 27 Saltaire mill and the canal view.

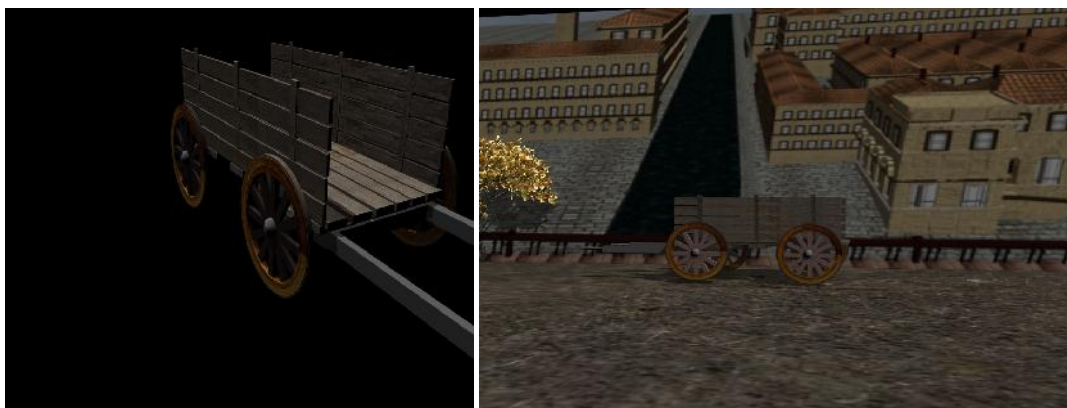Fig. 28 Saltaire view of 21ˢᵗ century presented in unity

Fig.29 cart used during the C, 1850

Fig 30 Train model of c, 1850 side and front view

Once the 3D model was developed the next process in animation is texturing which involves modifying the scenes and appearances of 3D models. The model developed of train is textured using Blinn and Lambert material and further adding colours to give it a realistic look. There are different textures applied on the models which are shown below. Figure 31 image show the road texture between the salt mill and houses known as Victoria road. Figure 33 show the texture image of sky and the roof texture added on the houses Figure.34 display the textures have been added for the houses. While texturing the Saltaire village normal mapping have been used as it provides details to the objects without using more polygons. As normal mapping is a technique used to greatly enhance the appearance of a low poly model without using extra polygon which are mainly used in video games and another reason was the files were too heavy while modelling and hence to overcome this difficulty normal map was used instead of bump mapping.

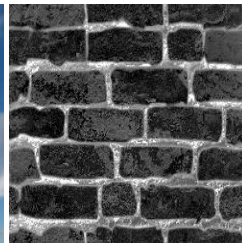Figure 31 road textures, c 1845   Fig.32 House Roof Texture   Fig: 33 Sky textures   Fig.34 Saltaire House Texture

Fig. 35 Texture for cart and cart wheel

1.1.1.1   Visualisation

Rendering and Animation:

The scenes were textured and basic lighting such as area light has been used in this project to enhance the scene. Once all the steps of modelling, texturing and lighting were completed the next

step was to implement the animation by animating the 3D buildings and convert it into a digital video. The 3D digital design is divided into two sections. The first section presents the digital video of saltaire site along with animated text explaining the Models displayed in the animation which is further sub-divided comparing the past situation (1850's) and the current situation (2009) of saltaire. The story include with the introduction and images of Saltaire Mill explaining the importance moving to next animation of Mode of transport it will display the different transport used around 1850's which are cart and train, whereas The digital animation presents the salt mill on the right and the smoke effect followed by presenting the train and the station. The animation will showcase the Different houses of Saltaire build for mill workers, the salt mill where people use to work for earning their living. The second part of animation display about the current period of time which includes the water canal where the water have been added in Maya by using the visor window. The Saltaire church showing a car moving towards the church as it was build after 1860's.

The next section of animation is presented by developing the saltaire site into the 3D Unity game engine making it accessible interactive with help of computer keyboard and mouse. Researcher has worked on the basic and starting level of Unity Software to present it with the help of saltaire site. The section of design presents the saltaire mill along with the saltaire church and Victoria road it also include the saltaire station. Since the work is carried out at the early stage the interactive access would be available from the salt mill to the church moving on till the entrance of the station. The Audience can access the site using the up and down arrow key for moving upwards and backward, whereas mouse would be used for turning right and left side view. Further work could be done on this project for developing the entire saltaire site which could be accessed with the help of a character. Visualisation presentation to create a virtual site from its originally present period and during other time period as it is now was implemented keeping in mind to make it useful for audience from children's to elders as well tourists and research students

The last part of animation is rendering which puts all the elements together to make the final realistic product. Rendering is very similar to cinematography, a cinematography do the same task of controlling lights and setting cameras and once a scene is set, film is developed. In animation process it is done with the help of rendering. In Maya there are two main render tools Maya Software and Mental ray. It also consists of vector render and hardware render most of settings are control through Render global menu. Maya Provides lots of option to render a scene. Mental ray is very popular render and support with 3dsmax, XSI (Autodesk Softimage) and Maya, generally Maya scenes transfer through mental ray very easily. The big advantage of mental ray is it has lot more advance features, like Global illumination which helps lights scatter very realistically throughout the room, we can use certain type of shedders and there are lots of advantages feature as we go deeper in research. There are various 3D software's available for rendering and visualization like Maya, 3ds Max, Maxwell Render and so on which are very useful tools but it's the decision of the animator which software will the final objects will be rendered and on this project the researcher had chosen Maya to complete the rendering process. As the 3d Digital animation is created in Maya and hence the render is been completed with mental ray.

Fig. 39: Rendering image

Fig .37 Unity view station

Fig. 38 House render

1.1.1   Data Editing

Giving animation the structure and flow is part of editing process. A good editing gives a fine touch to the animation as it helps to add other relevant data to the current one. With the help of data editing the user can shorten the video from different formats as for changing it from high quality to low quality, this techniques help to reduce the size and also to upload the video on YouTube. The researcher has used Adobe After effect software for adding titles and text in between the clips so that it guides the audience with relevant information about the project such the history of the building to make aware when it was constructed, who was the architecture. To make the Digital Animation more interesting simple background music has been updated.
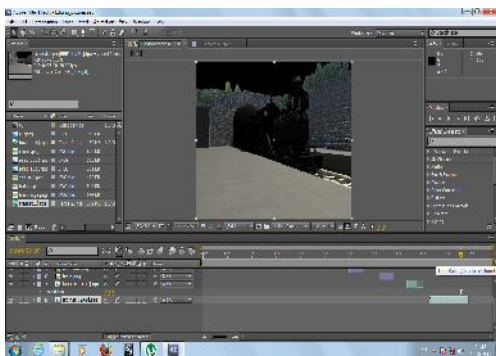

Figure 39: Adobe after Effects screenshots

1.1.1.1 Evaluation

Final outcome was evaluation of the design and texture which was implemented by changing its intensity level to make it look more realistic. To make aware of the animation further a survey was conducted for feedback and based on the responses valuation of results were outlined which is shown later. The survey was completed at an exhibition held in India were the final research was carried out to make people aware of the historic site. And Saltaire being situated in England gave them a digital representation though they are far away from the Historic Site. It would also be an alternate way of attracting tourist and many of the audience got to know about the brief history of Saltaire digitally.

1.2 Limitations of Digital Animation

The first limitation of this research project was that the work was carried out in India and the location of saltaire is situated in United Kingdom and hence the survey could not be conducted at saltaire as it would have given more feedback and response to the survey. Whereas, the project had effect on time and process due to not having enough facilities available such as good memory speed for the computer for developing the Digital animation. The other limitation is that this project requires a team of specialist to contribute to its development and production to carry out the entire Saltaire project to be presented in interactive form.

1.3 Evaluation of Results

1.3.1 Project validation:

Once the 3D Digital Animation was created the next step was to create a questionnaire. There were two questionnaire which consists of 8 questions each (Appendix B and C) was available. An exhibition was arranged for a day at an Animation Studio in Nagpur India were the viewers were given a short description about Saltaire and showed the Saltaire 3D Digital Animation video along with interactive access of the saltaire site prepared in unity they were asked to fill out a feedback form. The first Questionnaires were prepared and distribute among the visitors and Feedback was taken to gather the information about the Saltaire animated project. The second questionnaire was distributed among the Students and animators present at the exhibition to provide the feedback related to the digital presentation of the saltaire historic site. The list contains approximately 52 people as visitors, among them students and employees were around 30 of the audience and were of young generations, 15 people included Animators, whereas 7 included the elder generation age between 40-50 ages. The feedback survey was replied by 50 people. The data was collected in a Word document and later at the day end results were evaluated. The second Questionnaires was distributed among the 15 animators and 30 students total participant where 45 people, around 40 replied received from the participant which have been explained in next chapter.

1.3.2 Feedback & Analysis:

Many people were not aware of their cultural heritage and among them young generation include about 48% as per the survey response on this research. The responses from the audience have been very positive towards the Creation of the 3D digital Animation of Saltaire along with presenting it into a game form. Once the information was gathered the data was evaluated and the results of the first questionnaire on the question of whether the audience are aware about their countries culture and world heritage site result were that 40% people had knowledge about their countries cultural and heritage site and rest 50 % were not aware of it. The rest 10% were among others didn't respond. The audience who have taken the survey are of age 'between' 16 to 50 and as per the results it indicate that they are not aware the cultural and archaeology history and about the past ancient heritage. The creation of this historic 3D digital animation has taken a step further among the audience to bring awareness among our young generations which brings the need to display the 3D digital historic animation which is necessary as no steps can be taken further for preservations unless and until people are not aware of them. This survey also Results that the audience have chosen website to be convenient way to get the information of any historic places as this is the easier method of getting all the information at one place easily including the images. The audience voted for question (2) access to information with (65%) for website, (15%) Internet and (5%) would prefer books and (15%) would prefer documentary movies.

There was a huge positive response from the audience which agree with the researcher that animated video should be prepared to display the world heritage site, whereas the result on the question of presenting the world heritage site presenting in game showed a positive reply which result was (80%) with the rest (20%) of audience results wouldn't like to feature the historic site presented in games. This is because of the fact that may have both either negative or positive impact.

Having a glance on the responses researcher found that audience would prefer to focus on presenting this to small children's as a medium of educational video as they convey the story and history about our past centuries and it would be disrespectful to see their heritage in the form of game.

Analysing the results it indicates that there is a quite amount of audience who would not mind to view the WHS (World Heritage Site) to be presented in the form of game as far it's not disrespectfully presented, For example presenting a heritage temple in animation would be a good idea but games might hurt certain audience. As few of the sites are of religious nature such as church and especially temple these places are related for worship and would be kept in mind.

The second questionnaire received around 40 responses from the audience and the response has been evaluated and describe in Appendix D. After analysing the response it states that audience felt that digital design would benefit the historic site for future preservation which

indicated that presenting the this site would provide knowledge and support to students. Whereas presenting it interactively through game would give more access to visitors.

2.0 Conclusion and Future Work

The main objective of this research has been the identifications and revival of architectural animation of the World Heritage in a new perspective leading it to long-term knowledge and support informal resources which will help to raise the knowledge of future students along with local people. This project would help to evaluate the popular heritage site and allow helping the tourists accessing to our cultural and natural heritage sites. Evaluating the response and feedback generated from people about this project was extremely positive. Audience felt that displaying animation of the heritage site brings excitement to visit the site and creates knowledge as well. The Audience have welcomed the educational activity of these archeologically history and site. The mission of this research is a global growth of our culture and in animation field it's a first step towards presentation of 3D digital visualisation of the world Heritage site. Further, this animation can be presented at schools, seminars and museum or kiosk and start the recovery of the physical models in a digital form which will bring gab between our culture and tradition leading towards an innovative path for educational development towards our World Heritage Site.

Further this project will be imported to the advanced level of unity software and adding character to visualise through the surrounding area with the help of a team, as these tools are used to create 3D interactive digital mock-up visualisation for video game industry and game production. It would be enjoyed by children's and young generations. Previous games like STALKER Designed by (Randall Montanari 2007) have implemented quite amount of interest in the western countries about the Chernobyl disaster and has been attracting a lot of tourists. On the other side places like the Egyptian Pyramids and Angkor Wat temple are popular because of their historical significance and it is not affected at all because of it's misinterpretation in the games like the Tomb Raider series[BP99]. Further future work can be done with the collaboration with more animators as this project requires a team of specialists in different subject areas to contribute to its development and production.

The researcher will be delivering a copy of the research and result to present National Archive in Saltaire for Reference. And any information related to Saltaire and the 3D Digital animation created would be available from the website where there would be access link for Saltaire related other YouTube videos and can get related information on this WHS through email salt-design@hotmail.com. Website access would be at www.3Ddigitalanimations.co.in.

3.0 Reference

[AEU*08] ARNOLD, D, A.DAY, J.GLAUERT, S.HAUEGLER, V.JENNINGS B.KEVELHAM, R.LAYCOC, .MAGNENAT-THALMANN, N, J.MAIM, D.MUPU, G.PAPAGIANNAKIS, D.THALMANN, B.YERSIN, K.RODRIGUES-ECHAVARRIAL, *Tools for Populating Cultural Heritage Environments with Interactive Virtual Humans,* EPOCH Conference on Open Digital Cultural Heritage Systems (2008).

[AK10]Prof. Kristian Agger, 02-2010 PhD, Complex Geometry in Architecture based on Building Information Modelling, Aarhus School of Architecture

[BC00] BERNDT, E, CARLOS, J, Cultural *Heritage in the Mature Era of Computer Graphics*, *IEEE Computer Graphics and Application*, Vol. 20 Issue 1 (Jan. 2000) IEEE Computer Society Press.

[BE07] Evgeniya Boklage, PG Thesis, 2007: *CONCEPT OF REMEDIATION: FROM PRINT TO WEB. THE CASE STUDY OF 'SPIEGEL ONLINE'"* Department of Arts and Cultural Studies MA PROGRAMME IN DIGITAL CULTURE EVGENIYA BOKLAGE

[BS03]BARLO, SHAW, D,: *Balgarnie's Salt, Nemine Juvante* (Saltaire) Publications, (2003)

[CHA03]Champion, E.M.: *Applying Game Design Theory to Virtual Heritage Environments.* Int. Conf.Computer Graphics and Interactive Techniques in Australasia and S.E.

[FPM02] Foni, A.E., Papagiannakis, G., and Magnenat-Thalmann, N.: Virtual Hagia Sophia: *Restitution, Virtualization and virtual life simulation.* UNESCO World Heritage Congress, 2002.

[GS07] Slavko Gajevic 2007, MA Thesis (Mass communication) *Constructing a Traitor: How New Zealand Newspapers Framed Russell Coutts' Role in the America's Cup 2003* University of Canterbury

[JL07] JACOBSEN, J, HOLDEN, J: *Virtual Heritage: Living in the Past,* Technè 10:3(Spring 2007) Virtual Heritage.

[KA10] Prof. Agger.K, 02-2010 PhD, *Complex Geometry in Architecture based on Building Information Modelling*. Aarhus School of Architecture

[LS03] Ledermann, F., Schmalstieg, D.: Presenting an archaeological site in the virtual showcase. Virtual Reality, Archaeology and Cultural Heritage, VAST' 2003.

[NOZ03] N. Yastıklı, O. Emem, Z. Alkış: 3D *MODEL GENERATION AND VISUALIZATION OF CULTURAL HERITAGE* TR-80750 Besiktas, Istanbul, Turkey.

[MVG]Matthias Betz†, Mahmudul Huq†, Volkmar Pipek†, Markus Rohde†, Gunnar Stevens†, Roman Engler† Volker Wulf†() *An Architecture for Adaptive and Adaptable Mobile Applications for Physically Handicapped People*

[MH09] Hohl, Michael (2009) *Beyond the screen: visualizing visits to a website as an experience in physical space. Visual Communication.*

[MHY07] MAÏM J., HAEGLER S., YERSIN B., MUELLER P., THALMANN D., GOOL L. V.*: Populating ancient Pompeii with crowds of virtual Romans. In the 8th International Symposium on Virtual Reality, Archaeology and Cultural Heritage* (VAST'07).

[RJ06] Ronald J. Roy, 2006, Thesis BA Honours, *The Discourse of Urban Revitalization: Heritage Preservation in Saint John*

[RD03] Roussou, M., Drettakis, G.: *Photorealism and Non-Photorealism in Virtual Heritage Representation.Virtual Reality, Archaeology and Cultural Heritage*, 2003

[RW08] Wright, R. 2008. *Preservation of Digital Audiovisual Content.* Consulted February 18th February 2009 http://www.digitalpreservationeurope.eu/publications/briefs/audiovisual_v3.pdf.

[US05] SPIERLING, U, *Interactive Digital Storytelling: Towards a Hybrid Conceptual Approach,* Proceedings of DiGRA 2005 Conference: Changing Views – Worlds in Play.

[WAIC04] WOJCIECHOWSKI,R,WALCZAK,K, WHITE, M, CELLARY, W.*Building Virtual and Augmented Reality museum exhibitions;*Proceedings of the ninth international conference on 3D Web technology, Monterey, California,   ISBN:1-58113-845-8. 2004.

[ZCG05] Zuk, T., Carpendale, S., Glanzman, W.D.: Visualising Temporal Uncertainty in 3D Virtual Reconstructions. Virtual Reality, Archaeology and Cultural Heritage, VAST 2005. Virtual Heritage Network, URL: http://www.virtualheritage.net.

Amy Pickens: (2009) *Character Design with Variety and Purpose.* M.A thesis, the Guildhall at Southern Methodist University.

[NS04] Susan K. Nelson: (2004*) Perspectives on Archaeology and the New Ohio Social Studies Curriculum Standards: A Case Study of an Interdisciplinary Approach*. MA. thesis, Antioch University.

[AA10] ADARSH ATTAVAR: (2010) *INTEGRATING ADVANCED 3D DIGITAL TECHNIQUES WITH CONVENTIONAL METHODS AUTOMOTIVE DESIGN APPLICATION*. MA. University of Huddersfield

[HJ05] Jong H. Lim: (2005) *Archeological Site Management Planning: Focused on a Study of Management Guidelines for Hwangryong Temple Historic Site*. M.sc.thesis, University of Pennsylvania.

[HS10] Sarah Elizabeth Hawes: (2010) *Curating Architecture: An Investigation of the Motives and Practice of Architectural Collection and Exhibition with Recommendations for Interpretation of the Architectural Study Collection at Independence National Historical Park*. M.Sc.thesis, University of Pennsylvania.

[RK10] KANGONG, R, 2010. *3D ANIMATION AS A MEDIUM OF CULTURAL REPRESENTATION AND EDUCATION: A CASE STUDY OF MAGIC CELLAR PART 1*. MA. Johannesburg South Africa: University of the Witwatersrand.

[MR05] Rebecca L. McCleary: (2005*) Financial Incentives for Historic Preservation: An International View*, 37-44. M.Sc. thesis, University of Pennsylvania.

[KD06] Dina Kanawati: (2006) *Founding or Funding: Are Historic House Museums in Trouble? M.Sc,*University of Pennsylvania.

[IA10] Andrews, Ian: (2010) *Design Structures of Treasure Book Covers from the 6th to the 12th Century*. MA thesis, University of Huddersfield.

[LP00]Pi-Lien Chiu 1 and Jui-Che Tu 2: (00) *THE INVESTIGATION OF THE DESIGN AESTHETICS OF CULTURAL CREATIVITY COMMODITY OF MATSU FIGURE*, MA thesis, National Yunlin University of Science & Technology, Taiwan.

[JH02] Huh, j, 2002. *TOURIST SATISFACTION WITH CULTURAL / HERITAGE SITES: The Virginia Historic Triangle*. MASTER OF SCIENCE. State University: Virginia Polytechnic Institute.

[DT09] Taryn Marie D'Ambrogi (2009) *THE WRITING ON THE WALL: A CULTURAL LANDSCAPE STUDY AND SITE MANAGEMENT RECOMMENDATIONS FOR INSCRIPTION TRAIL LOOP, EL MORRO NATIONAL MONUMENT. .* M.Sc. thesis, University of Pennsylvania.

[MC10] Colahan, M, 2010. *Implementing Archaeological Conservation during American Nation-Building Efforts*. M.Sc. thesis. Pennsylvania: University of Pennsylvania.

BIBLIOGRAPHY:

[PN02] Nicolas Pioch. (14 Jul 2002). Hockney, David Available:

http://www.ibiblio.org/wm/paint/auth/hockney/.

[WAR06] http://www.wardsbookofdays.com/20september.htm.

[CHR09] http://www.chromavision.co.uk/yt/saltaire.htm

[BP99] Patrick Bregger. (99-11). Tom raider serious. Available: http://www.mobygames.com/game-group/tomb-raider -series. Last accessed 10 July 2011.

[SJ03] John Simkin. (2003). Titus Salt: Biography. Available:

http://www.spartacus.schoolnet.co.uk/IRsalt.htm.

Last accessed: 1st Sept 10.

[SS11]Triple nine Society/Shirley Sponholtz. 2011. *A brief History of the Road Buildings*. [ONLINE] Available at: http://www.triplenine.org/articles/roadbuilding.asp. [Accessed 04 March 12]

http://archive.org/stream/greatindustries00britgoog#page/n123/mode/1up: page 105- 110 Internet Archive. Web. 1 April 2012: 12:29 pm)

Great Industries of Great Britain. London: Cassell, Petter, Galpin & Co., 1884. page 105- 110 view (1 april 2012 : 12:29 pm)

Tarn, John Nelson. Five Per Cent Philanthropy: An Account of Housing in Urban Areas between 1840 and 1914. Cambridge: Cambridge University Press, 1973.

http://www.varchive.org/ce/theses.htm   15/04/12 : 15:27

Books:

[CD96] Dick, W., & Carey, L. (1996). *The Systematic Design of Instruction* (4th Ed.). New York: Haper Collins

College Publishers.

[FIR01] FIRTH, G, (2001): Salt & Saltaire - Images of England,Tempus Publishing Ltd., 2001.

[LPR92] Leshin, C. B., Pollock, J., & Reigeluth, C. M. (1992). *Instructional Design Strategies and Tactics*.

Englewood Cliffs, NJ: Education Technology Publications.

[HW02] Whitaker H. and Hales, J. (2002) Timing for Animation, Focal Press.

[RW01] Williams, R. (2001) The Animator's survival Kit, London: Faber & faber.

[MR04] Meade, T and Rima, S. (2004) may 6 the complete Reference.

[JH04] Hopkins.J (2004) "Shrek" from the swamp to the screen 7th edition.

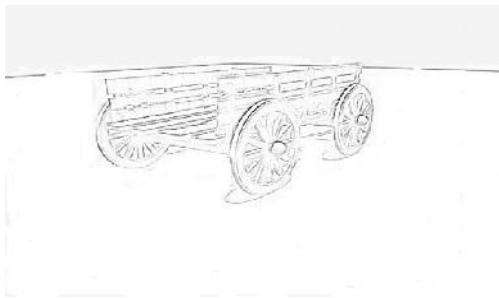[WA10] Andy Wyatt (2010), the complete Digital Animation Course, Thames & Hudson.

STORYBOARD

SALTAIRE
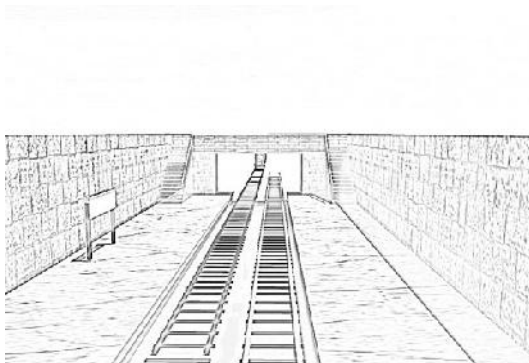
A combination of Salt+Aire

Developed between 1851 to 1876
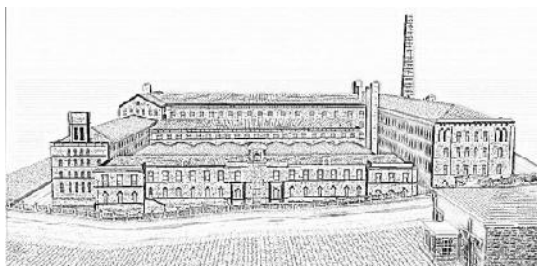
Build by Sir Titus Salt

2.

Mode
Of
Transport

3.

Saltaire Station c, The station was closed in 1956 but reopened in 1984.

4.

In 1853 salt mill was inaugurated and went into production and manufacturing. There were around 3000 workers employed producing around 30,000 yards of alpaca cloth each day. It was the biggest factory in the world during the 19th century.

Survey Questionnaire I:

1. Are you aware of the History of your Country World Heritage Site?

2. How would you prefer to get information about the World Heritage sites?

3. Do you think animating the World Heritage Site will bring worldwide public awareness to preserve the site?

4. What steps should be taken for bringing Awareness for the Heritage Site?

5. DO you think World Heritage Site should be presented in the form of Game or Animation video?

6. Is there any other World Heritage Site you would like to see Animated?

7. Would you like to add any further comments, share your views and feedback on this topic?

8. Archives with audio-visual content (e.g. photography, music, and video) will be able to develop commercially successful business?

Questinarrie II

1. Which sector are you working in?

   o Animation
   o Games
   o Design/ web related design
   o Film/specialist
   o Post production

2. Did you find this 3D digital animation useful with relevance to preservation for future?

   (Options) Yes / No / don't know.

3. Where you able to easily access the Saltaire site with the help of equipment provided?

   (Options) Yes / No

4. How valuable do you think is to interact with the Digital Saltaire Heritage Site?

   (Options)

   o Very valuable
   o Quite valuable
   o Not very valuable
   o Not all Valuable

5. Do you think the saltaire digital design would preserve the elements of the heritage and present them for future generation?

   (Options) Yes / No / don't know.

6. The technique involved of presenting the Site in form of game has been successfully presented?

   (Options) Yes / No / don't know.

7. On what scale would you rate this animation from 1 to 5 as one being the top and 5 being the lowest?

8. DO you have any suggestions to improve about this Animation and website?

Results of Saltaire Survey II.

- Among the 40 response received from the audience which include (15) animators and (25) students among the animators (5) were working in post production and (10) were Animators working as different 3D artist. The responses for the questionnaire are as follows:

- The second question response on did the audience find the digital animation useful the response were (80%) yes and (5 %) No it also include (15%) who didn't answer the question

- On the question of easily accessible of the saltaire site interactive generate a positive response with (85%) were Yes.

- The audience find valuable to interact with the digital presentation of saltaire world heritage site

- There were positive reply to present the world heritage with the technique used of presenting it in a game form and participant thought it would be better way to store them through Digital design.

- Testing the skills used in animation from question 7 the response was (25) people rated the animation as 4/5, (10) rated the animation as 3/5 There was no response from the (5) participant.

- Some suggestions have been listed below from the participant conducted on the survey:

  - The Entire saltaire site should be available in the game form.

  - There should have been more animation related to 19th century.

  - It would have enhanced the animation with character models added.

  - The attempt was successfully presented by the Animator.