A Virtual History of Mauritius

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Abstract

Mauritius has a lot of cultural heritage sites that, until recently, have escaped our notice. It is only recently that archaeologists have started making excavations to gather more information on these sites. This would eventually be used to rehabilitate these sites but real reconstructions pose many problems: do we have sufficient funds to do so? What happens if insufficient information has been gathered, thereby resulting in an inaccurate reconstruction? The aim of this paper is to present another way of rehabilitating cultural sites that is cheap while offering numerous advantages over real reconstructions: Virtual Reconstructions. Historical reconstruction of the Aapravasi Ghat and the Grand Port Naval Battle will be considered and finally some preliminary work that has already been carried out will be presented.

Keywords: Virtual Heritage, Virtual Reality, Archaeology, Mauritius

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1. INTRODUCTION

Since it was discovered by the Portuguese between 1507 and 1513, Mauritius has gone through several colonisation stages: the Dutch inhabited the island from 1638 to 1710; five years after they left, the French took procession and ruled till 1810 when the British invaded the island. The latter stayed till 1968 when Mauritius gained its independence.

These different periods have left several vestiges on the island and most of them are right now in a pretty bad state. Some of the most famous like the Aapravasi Ghat in Port Louis and Fort Hendrik in Vieux Grand Port are being restored and archaeological excavations are being carried out respectively. Yet, many sites are still in ruins and if we want to preserve these treasures of our history, these sites need to be rehabilitated. However, there are many obstacles to that:

- we know very little about most of these sites and it is only now that archaeologists are doing excavation work on them
- some sites cannot be fully reconstructed since part of it lies under new construction
- these reconstructions will cost a lot of money and right now, this money would better be spent on other major education and IT development projects

So what is being suggested in this paper is an alternative to reconstructing the different sites. An overview of how the Aapravasi Ghat can be reconstructed and what benefits can be derived from it will be provided; the aim is to show that virtual reconstructions can be used as a decent alternative to real reconstruction and also, we will consider the different types of virtual environments that can be used in different reconstruction scenarios. A case will also be made for a Virtual Mauritius to be reconstructed.

As proof of concept in this paper, we will consider two major periods of our history; the Indentured experience in Mauritius and the Naval battle of Grand Port.

1.1 The Aapravasi Ghat

Situated in Port-Louis over an area of 1640 m^2, the Aapravasi Ghat is where Indian Indentured labourers were received when they arrived in Mauritius. After the abolition of slavery in 1835, a new source of cheap labourers had to be found to work on the sugar plantations and indentured labourers were thus brought from India. The Aapravasi Ghat was constructed in 1849 to receive and transfer them to their respective plantations and monitor them during their stay in Mauritius. The Figure 1 below show a map of the Aapravasi Ghat site.
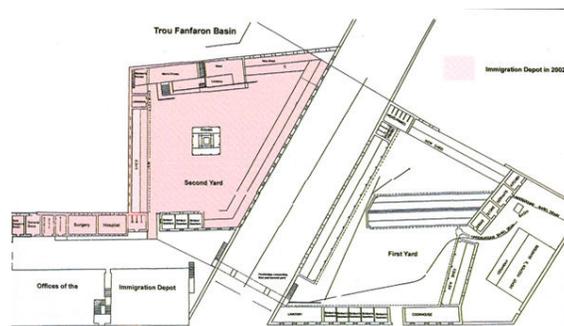

Figure 1 Scaled down Plan of the Aapravasi Ghat [APR01]

In 1910, the British put a stop to the arrival of Indentured labourers to Mauritius and eventually the Aapravasi Ghat site was deserted and fell in ruins. Currently, only a small

portion estimated to 15%[WIK02] of the original site remains. To save this unique part of our history, the Aapravasi Ghat Trust Fund was set up in 2001 and in 2002 excavations began at the site. Eventually in 2006, the Aapravasi Ghat was recognised by UNESCO as one of the World Heritage sites. However, despite the best efforts of the trust fund, it would nearly be impossible to fully reconstruct the Aapravasi Ghat since part of it is now under the motor way and other building in Port-Louis. [APR01]
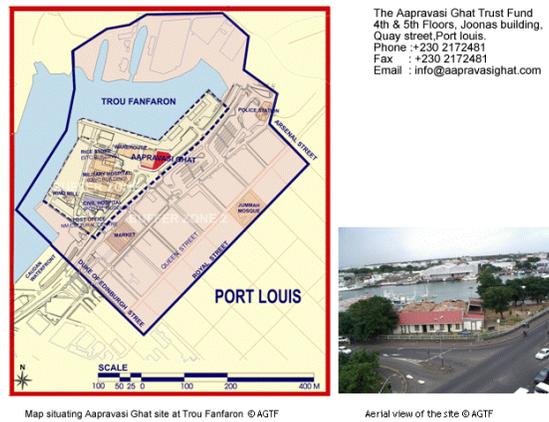
Figure 2 Map of the current Aapravasi Ghat and photo [APR01]

1.2 Grand Port Naval battle

This battle took place in August 1810 in the bay of Mahebourg on the south east cost of Mauritius and it is the only French naval battle victory of Napolean. During the Napoleonic wars; the British had seized Rodrigues and Reunion island and Mauritius (then known as Ile de France) was the only island in the Indian Ocean still under French rule. In the night of the 13th to the 14th of August, while the French commander Duperre was not in Mauritius, the British frigate Nereide managed to seize Ile de la Passe - a small island guarding the narrow access to the Mahebourg harbour where the French had a fort and a garrison of men. When the French naval squadron returned to Grand Port with their three ships and two captured Indiamen on the 20th of August, they fell unawares under British fire near Ile de la Passe but still managed to get into the lagoon. Thereafter followed a battle during which the British lost the HMS Sirius and HMS Magicienne and eventually saw the British commander Pym surrender to the French. Several tactical decisions were made during the naval battle which led the French to win over the British in the shallow lagoon where the battle took place.

Figure 3 Google map view of the bay of Mahebourg

These two above represent two very important but also two very different reconstruction scenarios. For the Aapravasi Ghat, a simple reconstruction of the buildings is enough; the most important part here is the building and the people moving around. For the Grand Port Naval battle, just reconstructing the ships is not enough. The actual battle taking place is of utmost importance and as such reconstructing the naval battle will be of utmost importance.

Both of the above are part of a field of Virtual Reality known as Virtual Heritage which can be described as the use of computer related technologies to reconstruct events of the past. These events need not be static, dynamic events like battles can also be represented using interactive technologies.

1.3 Related Work
Virtual Heritage is not a new field and a lot of work has already been carried out. Its importance has been recognized in many countries like Egypt where numerous pyramids and temples have already been virtually reconstructed. These reconstructions are closely linked to archaeology as data first needs to be gathered. Among these projects we have "Medieval Turku: The Lost City. A Project Trying To Reconstruct A Medieval Town In Finland" (Uotila & Sartes 2000) and "Modelling virtual worlds for exhibition purposes Virtual Trondheim of the 14th century" [CWH98] which resemble what is being proposed here for Mauritius.

2. TYPES OF WORLD
Virtual reconstruction should resemble as closely as possible the actual archaeological sites. These reconstructions can be classified according to several criteria namely immersiveness, and interactivity. However, finding metrics to quantify immersiveness especially in the case of desktop-based Virtual Environments is quite complex as it would involve measuring physiological responses. Interactivity, though not easy to quantify, usually provides for an easier way of differentiating between virtual worlds. We will thus broadly classify virtual worlds as active and passive based on interactivity.

2.1 Passive Virtual worlds
Some virtual worlds are geared towards exploration; interaction with inert objects and avatars are limited. This is similar to physical reconstructions with the advantage that we will be able to show people in their everyday activities. In the case of the Aapravasi Ghat a physical reconstruction would include only buildings but a virtual one would show the "Sirdars", the labourers walking up the steps into Aapravasi Ghat, doctors working in the surgery, food being cooked in the kitchen. Immersion in the virtual world is thus heightened through co-presence but the level of immersiveness would be between Engaged and Minor acceptance (William R.Sherman & Alan Craig 2003) since the user is a mere visitor and no transformation is experienced.

2.2 Active Virtual World
This would involve reconstructing the site that we are going to refer to as "world" as a game. This builds and adds onto passive worlds and takes us to another level of immersion which might now be described as between Engaged and Full mental immersion through increased interactivity. Active virtual worlds add presence in the sense that we should now be able to interact with avatars and inert objects in the virtual world.

The main advantage of this type of reconstruction is that it is not just the site that is being reconstructed but a part of history as well; for example, reconstructing just the ships and the forts involved in the battle of Grand Port – as a passive virtual world - would be interesting but being able to control the ships and thus recreate the naval battle and possibly this time make the British win the battle would add another dimension to the world.

However, there is a downside to it; reconstructions of this type can't usually be made as accurate as in passive reconstructions since a lot of processing power has to be reserved for the physics and, Artificial Intelligence needed for animating objects in the world.

This type of reconstruction would suit the Grand Port naval battle but here again two type of game genres can be used: Role Playing Game (RPG) or Real-time Strategy Game (RTS).

- Real-time Strategy Game
  RTS type environment can be used where the overall picture of the world is required. The world is usually seen from a top view and the role of the user is like that of a general controlling his army. Typical examples of such games include WarCraft and Age of Empires among others.

- Role Playing Games (RPG)
  RPG type environment allows for good reconstructions where the emphasis is laid on interaction. These are typical of games where the player is a character inside a more or less complex world. Good examples of that would be games like Tomb Raider.

The Grand Port naval battle can be reconstructed as a mixture of role playing and strategy based game. A pure strategy based environment would favour interactivity over exploration but a mixture of those two would be ideal for Virtual Heritage and this would be an invaluable tool for teaching students about our local history and it would also allow historians to simulate what would have happened had the French or British commanding officers made different tactical decisions during the battle.

Recreating the virtual world is only one stage in the virtual heritage process. The second important aspect to consider is on which medium the world will be viewed. A simple computer can be used but a better alternative would be to use more immersive set-up like using Head Mounted displays (for more immersive display) and data gloves (to enable force feedback) which would render the world much more real. Alternatively if a multi-person immersion, more sophisticated equipment like the CAVE would be more appropriate but certainly more costly.

3. RESULTS

We now present the result of some preliminary work carried out on the reconstruction of the Aapravasi Ghat as a passive virtual world as an example of what can be achieved using virtual reconstruction. Parts of the site has been modelled using the free software (the downside is the watermarks appearing in the rendered version) Maya PLE 6.5.

The plan of the Aapravasi Ghat site (obtainable from the Aapravasi Ghat Trust Fund) and photos were used to model the site. Eventually a choice had to be made concerning the modelling technique to use and it was decided that polygon modelling will be preferred to

NURBS and subdivision – polygon modelling allows for greater compatibility between modelling software and game engines. For example, Figure 5 shows the kitchen as it appears when modelled in 3D.

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Figure 4 Wireframe view of kitchen	**Figure 5 Crude rendered view of kitchen**
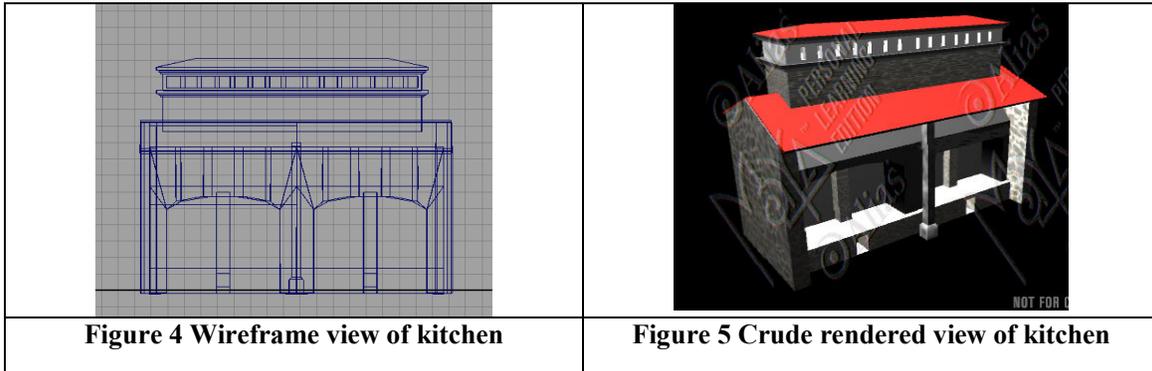
Figure 6 and 7 below show the modelled and rendered hospital block compared to the real one. Despite the fact that the modelled version still needs some fine tuning, what can be seen is promising.

Figure 6 Crude rendered view of hospital	**Figure 7 Current photo of hospital [APR01]**
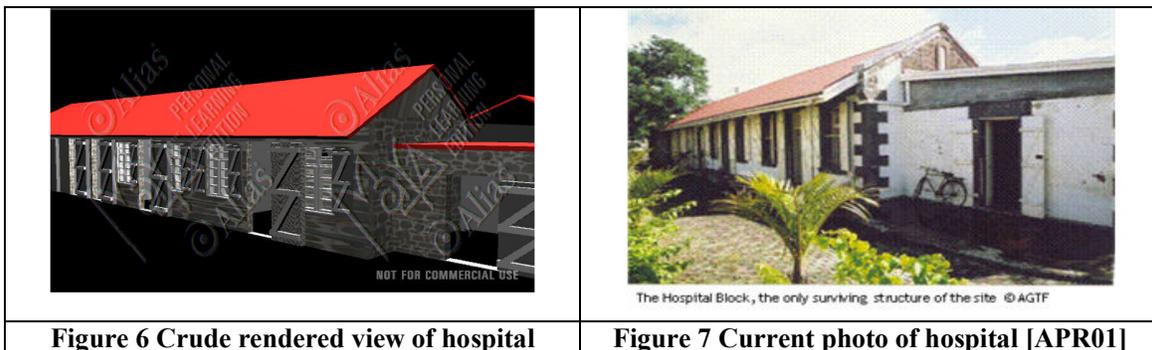
4. EVALUATION

The results obtained, though still at a very early stage of modelling, are quite promising and with better texturing (and bump mapping the wall), a skybox and some smart avatars we should have a very realistic world. This should open the door for similar projects.

Vestiges of our past colonial rule is scattered throughout the island and financially it will be difficult to reconstruct them all. An alternative will be a virtual Mauritius which could either be reconstructed as active or passive virtual worlds. Apart from the financial obstacle, a virtual reconstruction will be less vulnerable to the current the lack of information for a complete reconstruction since a virtual reconstruction can always be amended. Moreover, a virtual 17th century Mauritius presented in a CAVE would be a wonderful historical and educational tool for Mauritius.

Mauritius is a small island and this constrained environment makes it an ideal test bed for the reconstruction of a whole virtual country.

5. CONCLUSION

The aim of this paper is not to advocate virtual reconstructions as the only way to rehabilitate our cultural heritage sites but rather to propose virtual heritage as an alternative to real reconstruction. A virtual reconstruction is never going to match a real reconstruction but the latter is more costly and much less flexible than a virtual reconstruction would be. Moreover with the tight budget that is available to us in Mauritius, virtual reconstructions will prove a very valuable way of at least reconstructing prototypes of our cultural heritage sites and one day why not make a Virtual Mauritius of the 17th, 18th and 19th century so that journeys of the past become something absolutely normal.

6. ACKNOWLEDGEMENTS

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