

# Recreating Poompuhar Ancient History Using Virtual Reality



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**Abstract** It is necessary to ensure historic artefacts that are damaged or deteriorating are accurately documented, and that steps are done to restore them. To improve user experiences in the areas of virtual visitation, science, and education, this paper explains a method of repurposing and restoring historic structures. Nowadays, virtual reality, immersive reality, and augmented reality applications play a major role in allowing people to view and learn about historic monuments, sites, scenes, and buildings. The procedure for working employs digital models that are then integrated into a virtual reality environment that is interactive and immersive. The work method was applied at a Poompuhar is likewise called Kaveripattinam, and one of the maximum exceptional historical Chola ports played a essential position in maritime records of Tamil Nadu. To recreate, to feel, to inculcate interest closer to the research of the cultural heritage, to enhance tourism, this project brings up a new technology closer to mastering and enables masses to push tourism. This work demonstrates how the details of a severely degraded historic structure were retrieved digitally. We created 3D models using Blender which helped to restore deteriorated and nearly non-existent historical buildings, and the resulted images were inserted into game engine Unity, then by using the cross-platform VR environment, they were introduced into an immersive and interactive VR experience. The end consequence, however, is a virtual reality environment that is both immersive and interactive that contains architectural and artistic content developed utilising the Unity video game engine, allowing the user to explore, watch, and interact real-time interaction with a cultural heritage site.

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## 1 Introduction

Virtual reality is one of the newest technologies for recreating historical buildings and monuments from a past age, in which the user interacts with a virtual environment or scenario. For scholars and researchers, virtual heritage serves as a platform for learning, motivating, and comprehending certain events and historical features. Poompuhar is likewise called Kaveripattinam, and one of the maximum exceptional historical Chola ports played an essential position in maritime records of Tamil Nadu. Poompuhar is placed near the spot in which the River Cauveri flows out into the ocean in Nagapattinam District. This historic port town in advance known as Kaveri Poompattinam, served because the Capital of early Chola rulers. Original city became destroyed via way of means of sea and submerged probably in 500 AD. To recreate, to feel, to inculcate interest closer to the research of the cultural heritage, to enhance tourism, this project brings up a new technology closer to mastering and enables masses to push tourism. The main aim of the work is to insist the tourism, the conventional Poompuhar via an interactive experience. Virtual reality technology enables us to inspire youngsters to discover extra interactively and interestingly. Through the practical surroundings, we are able to revel in the conventional locations through the usage of virtual reality tool and feature a real revel in. This work explains how to get a final output that is relevant to cultural heritage. The resulting digital documentation was turned into an interactive virtual reality experience. VR and AR technology have recently advanced to the point that they can now be utilised on smartphones and tablets, giving cultural heritage organisations with wealth of new ways to attract and engage consumers.

## 2 Literature Survey

Virtual reality is used in many fields and applications for the benefit and growth of the society. VR is used in industrial training where it saves time and repeated training in the same area. To educate kids on exploring Moon and Space station, virtual reality technology is used with Unity3D along with Blender software [1]. This paper includes various VR implementation in the field of production domain and interactive feedback system to improve the production efficiency and quality [2]. VR also plays an important role in medical field, and it has been used in artificial respiration system. The risk of intubation can be reduced due to the VR-based simulation [3]. VR has also been developed for multipurpose health applications, such as rehabilitation of

lower limbs and MRI feedback system for various brain regions [4]. VR state-of-the-art review states that, VR in tourism and holistic marketing strategies has been improved and it can also be focussed in the achievement towards organisational goals [5]. The paper suggest that tourists use VR as a travel substitute during and even after a pandemic. However, perceived risk does not play a significant role when it comes to using VR [6]. The paper has discussed about the perceived benefits associated with the incorporation of virtual reality in travel and tourism for better destination image [7].

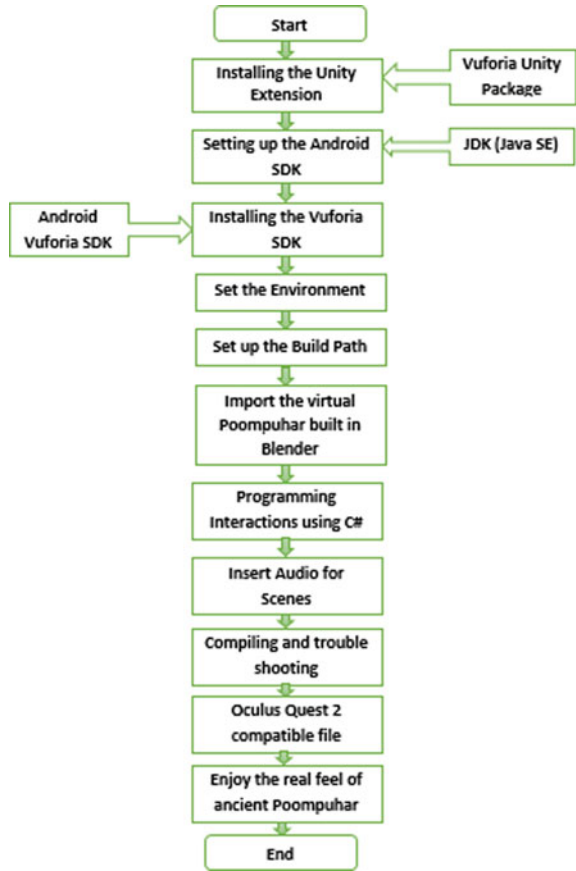
The research paper covered a description of the history of VR/AR enabling technologies, the currently popular VR/AR equipment, and several use cases of VR/AR applications for the tourism like virtual attractions at effective cost, interactive dining experience, booking rooms, exploring the property, experiencing the rich luxurious restaurants, hotel management, etc. [8]. They demonstrated a mobile application that uses augmented reality to improve the shopping experience in large retail establishments in this work. First, they combined DL approaches to locate the customer in the store and advise the customer to the location of the requested goods. Second, the client can visualise the products and models in the store utilising AR. The buyer cannot only visualise a product but also obtain useful information about it, such as specifications, other available models, sizes, and so on [9]. The virtual reality system presents an alternative to the existing real-estate industry. Customers can view simulations of real-estate properties using this technique. This also gives a comprehensive perspective of the property both before and after it is built. The suggested system provides users with a realistic experience by combining mixed reality with virtual reality in simulation. The greater interaction is accomplished because of the combination of AR and VR. It has achieved all of the objectives, such as understanding the outside environment for scene in frame outline, distinguishing floor and wall from scene, establishing appropriate tracking or detection points using sub modules, and reducing the high-rendering time of 3D models using Android graphics [10].

### 3 Proposed Work

The overall goal of our work is to propose a method for virtual retrieving the architectural structures, features to restore deteriorated, and nearly non-existent historical buildings using traditional and novel tools, so that these digitally reconstructed buildings can be displayed in a virtual environment for everyone's enjoyment. To meet this outcome, the following objectives are set.

- Using traditional methods, create a virtual reconstruction of the building using 3D model from Blender.
- In Blender, recover buildings, places, and sketches that are hidden from view.
- Obtain a digital restorations of the buildings and places.
- Create an interactive model that can be viewed with a head-mounted display (HMD).

**Fig. 1** Technical flowchart of the work proposed



- By using the virtual reality headset, it allows the user to interact with digital information in this virtual world.

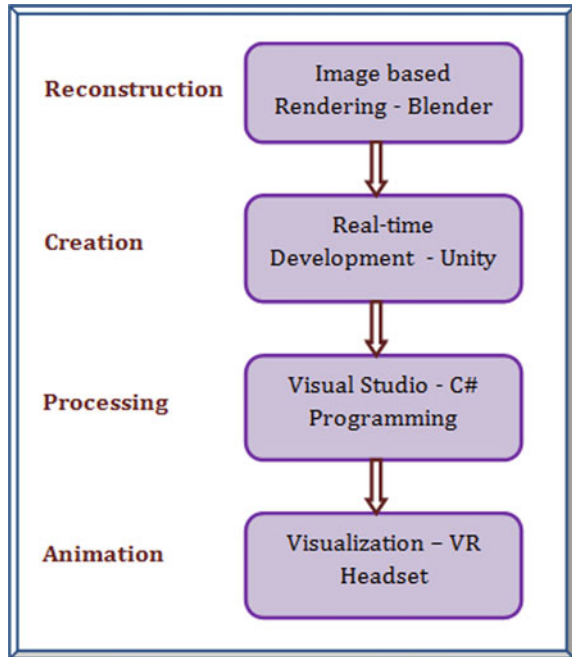
The work flow model is described in the below flowchart in a diagrammatical manner (Fig. 1).

## 4 Technology Used

### 4.1 Blender

There are various 3D animation software available. Most of these, such as 3D Max and Maya, are proprietary. The use of experiments created with such software is limited to colleges that can afford it. 3D simulations/animations created with open-source

**Fig. 2** Workflow in processing the digital images for rendering building constructions in 3D



technologies, such as Blender, on the other hand, can be more widely distributed, have greater scope for user customisation, and so on. Blender, in general, provides us with all of the benefits of any open-source software. In the last 20 years, advances in CAD have moved the design paradigm from synthesis to integrated design, in which the design process is assisted and informed by multiple disciplines at the same time. Blender is an open-source modelling, animation, rendering, and compositing software suite. Its utility as a design tool is based on its general tool set, which allows for the creation of design complexity through the use of basic functions and data containers. The 3D models of Poempuhar deteriorated, and vanished places are exported from Blender as a.fbx (prefab) file, which is then loaded into Unity and used as 3D GameObjects (prefab).

Figure 2 depicts the process of reconstructing and recovering architectural structures from historic building ruins, as well as visualising them in an interactive virtual reality environment using head mount display.

## 4.2 Unity3D

Unity game engine is able to create 2D and 3D games. Unity3D has a plenty of functions to provide. Unity3D creates JavaScript and/or C#-based apps. The animation or real-time transition of the GameObjects defined in the programme is assigned using

these. Unity3D’s graphical user interface (GUI) makes it simple for a new developer to script and programme the GameObject transition. Unity is a comprehensive environment that includes the PhysX physics engine, the mechanism animation system, a self-contained landscape editor, and much more. It also works with the MonoDevelop code editor allows any modifications made in MonoDevelop to be transparently compiled and placed into the game using Unity’s C# or JavaScript compilers. The Unity console window displays compilation errors. Finally, the entire job is converted to use in a VR device using the Oculus SDK after the full 3D work is completed. Once done, it is converted into VR device compatible file to enjoy the immersive experience.

### 4.3 Image-Based Rendering

This technique aims to provide more accurate and faster renderings whilst simplifying the modelling process. Images are used as modelling and rendering primitives in image-based rendering. This method is said to be a good one for creating virtual views with specified objects and under certain camera motions and scene conditions. This technology generates a new view of the 3D environment from the input images.

Figures 3 and 4 are a few amongst the scenes that are recreated with the help of image-based rendering techniques.

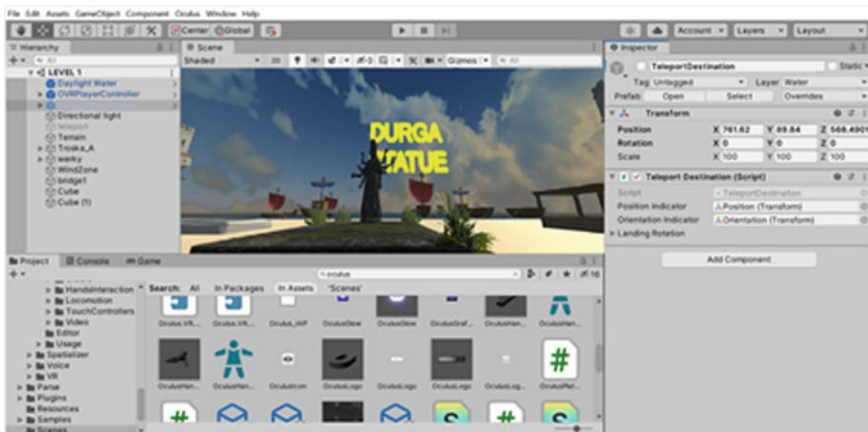


Fig. 3 Durga statue



Fig. 4 Outside view of Manimandapam

## 5 Results and Discussion

The research produced a 3D model of the Poompuhar city, which offers a comprehensive state-of-the-art review of prior research in the area of VR tourism. It adds to the body of knowledge in this VR field by proposing a new classification of virtual reality in tourism based on the levels of immersion. The output from the unity is deployed in Oculus Quest with its respective animations where the audio message helps the viewer to explore the ancient history that are visualised. The Tamil Nadu tourism Website has explored the real-time monuments through virtual reality, whereas we tried to bring back the destroyed history into reality.

Below are given a few of the scenes recreated for building a new Poompuhar city with the help of the original (Fig. 5).

## 6 Conclusion

The proposed method creates a virtual environment of Poompuhar city by reconstructing various destroyed places in the city. This helps to preserve our ancient heritage and provides a chance to view the destroyed historical places. The recent news proves that Hajj visit can be experienced using virtual reality which satisfies the dream of Muslims who were unable to visit Hajj in real. This would be useful for the disabled people to explore various places from their residence. Let us educate our younger generation by bringing back our ancient history into reality. This paper can be enhanced further to develop more ancient monuments which has been destroyed due to natural disasters.


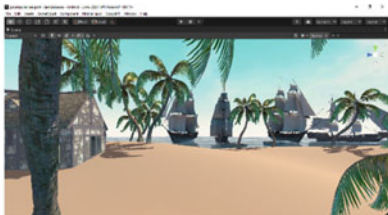




Name of the Places at Poempuhar	Original Ancient Places at Poempuhar	Recreation of Ancient Places at Poempuhar
Maruvurpak kam - A place near sea shore		
Sea Port		
Main streets of Poempuhar		

Fig. 5 Scenes recreated for building a new Poempuhar city




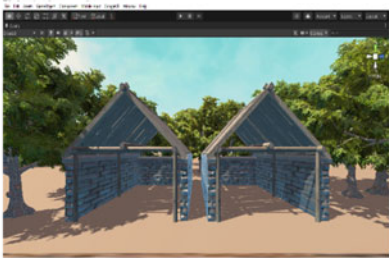

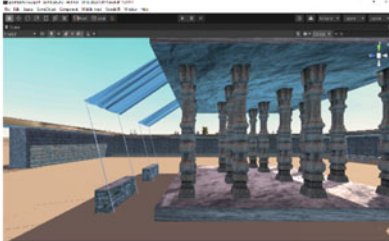

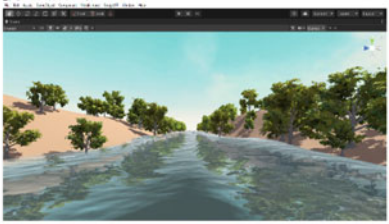


Name of the Places at Poempuhar	Original Ancient Places at Poempuhar	Recreation of Ancient Places at Poempuhar
Storage spaces for storing goods		
Market places in Poempuhar		
River bank of Cauveri in Poempuhar		
Pathinaaru Kaal Mandapam		

Fig. 5 (continued)

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