Software Requirements Specification
for
Majuli River Island Virtual Tour

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Chapter 1

Introduction

1.1 Purpose

The purpose of this document is to give a detailed description of the requirements for the Majuli River Island VR tour software. It will illustrate the purpose and complete declaration for the development of the system along with the system constraints. This document is primarily intended to be proposed to a customer for their approval and as a reference for developing the first version of the system for the development team.

1.2 Conventions

Term	**Definition**
The Island	Refers to Majuli Island, a river island in the Brahmaputra River
The Temple	Refers to Auniati Temple in Majuli Island
VR	Virtual Reality
HMD	Head Mounted Display
ID	Identification Number
DESC	Description
RAT	Rationale

1.3 Scope

The software will provide an immersive virtual tour of the inland river island Majuli and one of the temples located on this island, Auniati temple, to the user, specifically through multimedia content. This will help in the preservation of heritage and promotion of tourism of Majuli island. This software is meant to be deployed over the Oculus VR HMD with hand controllers.

Chapter 2

Overall Description

2.1 Product Perspective

The software aims to promote tourism and preserve the heritage of the Majuli River Island by providing the user with an interactive and immersive virtual tour of the island showcasing the architecture, ecology, daily life, geography, traditions, rituals and religious practices of the people of the island. The product is completely independent, self-contained, and stand-alone software.

2.2 Product Functions

The software is a VR application that will first, introduce the island. This will be followed by placing the user on a virtual recreation of the island, where the user can move around using the map (teleportation) and locomotion. It also provides audio-visual cues such as ambient music, 3D models, folk songs, devotional chants, ritual videos, and images taken of the real site in the virtual world, to make the application more immersive. The product uses VR Headsets to provide an immersive experience of the virtual world.

2.3 User Classes and Characteristics

Our intended users are people who have experienced or are enthusiastic about VR. There are four kinds of users identified, which are explained in detail below:-

2.3.1 Devotees

Context

People who are devout worshippers of the local deities and have deep feelings associated with the temples and Gods revered on the island.
Also, the people who lived on the island earlier but have migrated elsewhere, but still want to be connected to the roots of their beliefs.

Goals

To be able to see and experience the daily rituals and practices of the temple.

Frustrations

- Cannot travel as and when they wish to the island and the temple, which are also difficult to reach.
- Very less multimedia coverage of the island and no immersive experience of the temple culture of Majuli Island.

2.3.2 Cultural Enthusiasts

Context

People who want to explore the heritage and culture of the various local places.

Goals

To know more about the island in order to understand its cultural heritage.

Frustrations

- Visiting Majuli is not very easy from different parts of the country or the world for physical as well as financial reasons.
- Popular websites like Google Earth or YouTube do not offer a first-hand perspective into the island's culture.
- There is not enough documentation of the Majuli island available as interactive content, and hence the digital exploration is unsatisfactory.
- The majority of the multimedia content available is only in the vernacular language, i.e., Assamese, and there is a severe lack of English/Hindi content.

2.3.3 Travelers

Context

People who like to visit new places on a regular basis, try to document or vlog the destinations they visit.

Goals

Get a good insight into the island's lifestyle, traditions, and culture before they visit.
Be informed about the places of interest, the modes of transportation available, and a general overview of the island to ensure smooth travel.

Frustrations

- Scattered information in the form of websites and articles.
- Videos and images of the island and its people are tedious to search and understand and offer only a passive experience of the island.
- Not enough motivation to visit the island due to lack of proper tourism support, especially for foreign travelers. Non-local tourists face language issues as most of the content is available only in Assamese.

2.3.4 Anthropologists / Experts

Context

Experts in various fields who want to understand specific local cultures.

Goals

Research local cultures to better understand the development of human societies.

Frustrations

- There are no digital records of places like Majuli, and so the only way for such people to understand these places is by visiting them physically.

2.4 Usability Requirements

From the analysis of user goals and frustrations, we have come up with a list of user needs that must be present in the product:

- **Immersive experience with multimedia coverage**:
  - Provide an immersive experience of the island as a whole and the temple, with extensive use of multimedia like sound effects, narration, text, and video. This experience may be personalised to some extent.
  - This experience should also showcase the cultural and archaeological heritage of the island as a whole.
- **Guided tour**:
  - Provide various forms of guides (like narration, map, and text) throughout for a convenient tour of the island and the temple.
  - However, there should be an option to disable such guides for users (like devotees) who may not be interested in going through the tour and only wish to participate in the experience of rituals.
  - Provide information about the cultural and archaeological heritage of the island and the temple for research purposes by field experts as well as cultural enthusiasts.
- **Teleportation**:
  - Users should be able to teleport to specific locations based on their preferences. For example, devotees would prefer to teleport to the temple without going through a guided tour.
- **Multilingual Support**:
  - Provide information and multimedia content in multiple languages for users from diverse linguistic regions.

2.5 Operating Environment

A VR HMD, particularly Oculus Rift HMD is to be used. The HMD must also be accompanied by two controllers for user input (one for each hand) and headphones for the audio.

2.6 Constraints

We are unable to model all flora and fauna of the island by ourselves, and thus have to use some assets available online which might not exactly resemble the island species. We are provided with a specific set of multimedia content (images and videos), and we need to build the system with this limited set of resources. Moreover, VR headsets are expensive and might not be accessible to a large number of people.

2.7 Assumptions

We assume the presence of a VR HMD with the user, along with the user having basic know-how of the usage of VR systems. Moreover, the user should be able to use the VR headset, i.e., have no vision abnormalities or psychiatric disorders. Moreover, the user is above the age of 13 years and can monitor his usage of the VR system, avoiding prolonged use.

Chapter 3

External Interface Requirements

3.1 User Interfaces

- *User-friendly design*: Provide an intuitive and easy-to-use interface with a clear display of various options and information.
- *Responsiveness*: Provide a fast and responsive virtual environment with smooth interactions and quick response time.

3.2 Hardware Interfaces

- *VR Headset*: A VR headset such as Oculus Quest or Oculus Rift is required to experience the virtual tour.
- *Hand Controllers and Sensors*: Oculus Hand Controllers and sensors (in case of Oculus Rift) are required for user interaction in the tour.
- *Processor and Graphics*: Sufficient processing power of CPU with at least 8GB RAM and good graphics card to support high-quality graphics and smooth performance of the tour.
- *Storage*: Adequate amount of storage to store the VR app and all its data.

3.3 Software Interfaces

- *Operating System*: Windows 10 or higher.
- *VR Support*: Compatible with VR platforms such as Oculus, SteamVR, and PlayStation VR.

Chapter 4

Functional Requirements

4.1 Start tour

ID - **FR.1**
INPUT - User command to enter the system
OUTPUT - Introductory multimedia
DESC - A short multimedia experience with audio and video is shown to the user, then they are spawned on to the island, after which the interactive tour starts

4.2 Navigate on island

ID - **FR.2**
INPUT - Current user location
OUTPUT - New user location
DESC - Different ways for user to navigate the island

4.2.1 Locomotion

ID - **FR.2.1**
INPUT - Current user location, movement direction
OUTPUT - New user location
DESC - User interacts with the system to cause movement in a particular direction on the island, leading to update in user's location on the island
RAT - The nature of the system to be developed (VR-based tour of the island) necessitates the need for locomotion

4.2.2 Teleport to location

ID - **FR.2.2**
INPUT - Target location
OUTPUT - New user location
DESC - User selects a location on the island, causing update in user's location on the island
RAT - Devotees, for example, would prefer to teleport directly to the temple irrespective of their current location

4.3 Play Multimedia

ID - **FR.3**
INPUT - User location, user head orientation
OUTPUT - Multimedia Content
DESC - Various multimedia content will be shown which may depend on the location and head orientation of the user
RAT - It will help provide an immersive experience and capture the ambience of the surrounding environment. User can control the multimedia to some extent (change volume) to get a personalised experience

4.3.1 Play Ambient sounds

ID - **FR.3.1**
INPUT - User location
OUTPUT - Audio
DESC - Identifies user location to decide which audio file has to be played (if any) to capture the ambience

4.3.1.1 Control Sound Volume

ID - **FR.3.1.1**
INPUT - New volume level
OUTPUT - Confirmation/error message
DESC - To allow user to increase or decrease the volume of the ambient sound

4.3.2 Play Video

ID - **FR.3.2**
INPUT - User location, user head orientation
OUTPUT - Video
DESC - Identifies user position and orientation to decide which video file (if any) has to be played
RAT - To display rituals and daily activities happening in and around the temple

4.3.2.1 Control Sound Volume

ID - **FR.3.2.1**
INPUT - New volume level
OUTPUT - Confirmation/error message
DESC - To allow user to increase or decrease the volume of the video playback

4.4 Provide Guides on Tour

ID - **FR.4**
INPUT - User position, user head orientation
OUTPUT - Guides (if any)
DESC - Various guides to provide information to interested users in the form of map, text, and narration
RAT - Map would be useful for navigation around the island, mainly for travelers and experts. Narration would provide basic information about the history and heritage of the island (aimed at travelers), while text is for providing detailed account of the same (aimed at field experts)

4.4.1 Play Narration

ID - **FR.4.1**
INPUT - User position
OUTPUT - Audio
DESC - Identifies user position to decide which audio file has to be played (if any), if the user chooses to

4.4.1.1 Control Sound Volume

ID - **FR.4.1.1**
INPUT - New volume level
OUTPUT - Confirmation/error message
DESC - To allow user to increase or decrease the volume of the narration
RAT - To allow user to get a personalised experience of the narration

4.4.2 Display/Hide Text

ID - **FR.4.2**
INPUT - User position, selection
OUTPUT - Text
DESC - Based on user location, descriptive text will be displayed/hidden when user selects specific objects

4.4.2.1 Change Text Size

ID - **FR.4.2.1**
INPUT - Font Size
OUTPUT - Text with updated size
DESC - To allow user to change text size based on preferences
RAT - User can personalise his experience of text guides on the tour

4.4.3 Hide/Show Map

ID - **FR.4.3**
INPUT - User selection
OUTPUT - Map
DESC - Allows user to open/close the map

4.4.4 Switch Language

ID - **FR.4.4**
INPUT - New language
OUTPUT - Confirmation/error message
DESC - Allows user to switch the language of the guides in the tour
RAT - This ensures multilingual support for uses from diverse linguistic backgrounds

4.5 Exit

ID - **FR.5**
INPUT - User command to exit the system
OUTPUT - Confirmation message
DESC - User selects an option to exit from the system and gets a confirmation message for the same

Chapter 5

Other Nonfunctional Requirements

5.1 Performance Requirements

- **Realistic Graphics**:
  - *High Frame Rate*: Smooth and consistent frame rate, typically around 90Hz, to prevent motion sickness and provide an immersive experience.
  - *High Resolution*: High-resolution display to provide clear and detailed graphics in the VR environment.
- **Seamless experience**:
  - *Minimal Load Time*: Quick load time for the VR app and virtual environment to enhance the user experience.
  - *Low Latency*: Minimal latency between user inputs and corresponding actions in the virtual environment including playing multimedia content and quick teleportation.
  - *Stable Tracking*: Stable and accurate tracking of user movements within the VR environment using hand controllers and sensors.
- **Resource and Power management**:
  - *Optimal Resource Utilization*: Efficient use of system resources to ensure optimal performance and prevent lag or stuttering in the VR experience.
  - *Power management*: Effective power management to maximize battery life and prevent overheating of the VR headset and other hardware components.

5.2 Software Quality Attributes

- **Maintainability**: Ease of maintenance and updating the system to address bugs, add new features, and improve performance. The code should be modular, understandable and well-documented for easy maintenance.
- **Availability**: The system should not fail during the usage, or minimal downtime should be there.