



Chaar Chand: Cave Automatic Virtual Environment for Indian Traditional Tales

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Abstract. Indian folktales hold layers of cultural knowledge and values about life and are more than just myths; they form an essential part of the nation's cultural heritage. Studies on recent immersive media installations have engaged audiences with multisensory storytelling through interaction, spatial experience and ambisonics sounds. This paper investigates the potential of immersive narrative formats for the re-telling of traditional tales. The project "Chaar Chaand (Four Moons)" examines how immersive media can reinterpret Indian lunar folktales towards cultural connection. Four Moon-related stories from different parts of India were reimagined: the Lotha Naga tale of the Sun and the Moon, the Mundari story of the Sun and the Moon, the Jataka tale of the hare's self-sacrifice and the Ganesha and Moon legend. These stories were presented in a Cave Automatic Virtual Environment (CAVE) projection with a 48:9 aspect ratio, using symbolic motion graphics, print-inspired textures and thematic soundscapes, with the Moon as a connecting link.

Sixteen participants experienced Chaar Chaand. The survey results indicated that the immersive format encouraged active exploration, personal interpretation and cultural connection. Participants also expressed curiosity about experiencing other cultural narratives through immersive formats. The project demonstrates how India's narrative heritage, combined with immersive media, can make traditional stories more accessible and invite audiences to look "beyond the surface" of folklore.

Keywords: Immersive storytelling, CAVE projection, Indian folktales, Moon, Narrative, Projection Mapping.

1 INTRODUCTION

Indian folktales hold layers of cultural knowledge and values about life and are more than just myths. They form an essential part of the nation's cultural heritage [1]. Many stories related to the Moon appear in different regions of India. The Moon becomes a symbol, a character or a point of reference that connects people to the sky and the passage of time.

Recent developments in immersive media have expanded the way stories are presented. Installations that use projection, sound and spatial layouts encourage audiences to move, look around and interpret visual cues. Examples include large scale exhibitions and independent artistic works that explore minimal storytelling and symbolic animation [2][3]. These methods allow stories to be experienced rather than read or watched from a single point of view.

This paper presents Chaar Chaand, an immersive media installation that adapts four Indian folktales related to the Moon. The work studies whether a Cave Automatic Virtual Environment can create a shared space where viewers engage with traditional stories through movement and perception. The installation uses no spoken narration. The visuals rely on symbolic forms, motion and sound. The Moon appears in all four stories and acts as the transition point between them.

This study investigates how non-verbal immersive storytelling within a CAVE environment can foster cultural connection and interpretation of Indian lunar folktales (see Fig. 1).



Fig. 1. Video presented on the CAVE system (Personal Documentation)

2 LITERATURE REVIEW

This section discusses previous work that informs the approach used in this project. It focuses on immersive media installations and CAVE systems, as these two areas directly relate to the design and implementation of the Chaar Chaand experience.

2.1 Immersive Media Installations

Immersive media installations place viewers inside a projected or spatial environment rather than in front of a single screen. These environments use projection, sound, and movement to shape how stories are perceived. Large-scale exhibitions, independent artistic works, and contemporary narrative formats show how spatial layouts can support open-ended interpretation.

Projects such as *GeOdysse* and other works by François Chalet use simple forms and gradual transitions. These works show how minimal visuals can support narrative understanding without relying on spoken dialogue or written text [2]. The viewer interprets the visuals through perception, movement, and personal association.

Installations like *Van Gogh: The Immersive Experience* and *The Da Vinci Genius Interactive Immersive Show* use 360-degree projection to create a continuous visual environment [3][4]. These installations show that audiences respond to scale, light, and ambient sound as part of the narrative. They often move through the space at their own pace, which leads to individual interpretations.

Within the Indian context, as storytelling has evolved from oral traditions to contemporary immersive formats, prior work has explored how technologies such as 360-degree VR animation can serve as a vehicle for preserving and reinterpreting cultural narratives [5].

These examples indicate that immersive environments can support narrative understanding without linear structure. They also show how sound and visual cues guide attention. These principles are relevant for the structure and presentation style used in *Chaar Chaand*.

2.2 CAVE Systems

The Cave Automatic Virtual Environment (CAVE) is a projection-based system that displays visuals on multiple walls within a room. Research describes the CAVE as an environment that supports natural movement, shared viewing, and spatial understanding [6]. Unlike head-mounted displays, the CAVE allows viewers to look around freely and interpret visuals without wearable devices. This creates a collective experience.

The CAVE system used for *Chaar Chaand* includes three projection surfaces arranged at right angles. This creates a panoramic environment with a 48 to 9 aspect ratio. The layout supports a continuous narrative that moves from one wall to another. It also allows transitions between stories without visible breaks. The system is suited for non-verbal storytelling because the viewer can follow motion across walls and interpret connections based on spatial cues.

These properties make CAVE environments suitable for cultural and educational installations. The ability to accommodate groups of viewers also supports shared experience and discussion. Based on these qualities, the study examined how a CAVE environment can present Indian folktales through non-verbal, spatial storytelling.

3 METHODOLOGY

To address this research question, the following methodology was adopted. This includes the selection of stories, the development of the non-verbal immersive format, the technical setup of the CAVE environment, and the evaluation process used to gather viewer responses.

3.1 Story Selection

The project focuses on stories related to the Moon from different regions of India. The Moon was selected because it appears in many Indian folktales and is associated with natural cycles, behaviour, and symbolic meaning. It also serves as a strong visual element that can connect different narratives in an immersive environment. Four stories were chosen after reviewing folktales from several regions. Each story presents the Moon in a different role.

Lotha Naga Story: The Sun and the Moon (Nagaland, Northeast India). The story explains why the Moon carries marks on its surface. It involves a sequence where the Moon loses its power due to pride [7].

Mundari Folktale: Sun and the Moon (Jharkhand, Eastern India). The Mundari story explains day and night through an event where the Sun chases the Moon across the sky after receiving poor hospitality during a visit [8].

Jataka Tale: The Hare's Self Sacrifice (Buddhist Culture). This story explains how the hare offered himself as alms to a visiting Brahmin, after which the god Śakra honoured the act by placing the hare's image on the Moon [9].

Amar Chitra Katha: Ganesha and the Moon (Maharashtra, Western India & Himachal Pradesh, Northern India). The Ganesha (Hindu God) and Moon story explains the origin of the Moon's blemish and its waxing–waning cycle, based on an incident where Ganesha curses the Moon after being mocked [10].

These four stories were selected because they offer clear visual events, can be represented without spoken narration, and use the Moon as a repeated reference point. Together, they cover different regions and narrative traditions, which supports a continuous multi story sequence within the immersive environment.

3.2 Visual and Narrative Design

The visual and narrative design was shaped by the requirements of non-verbal storytelling in an immersive environment. The approach drew on principles seen in the im-

mersive installations discussed in the literature review, such as the use of simple forms, seamless transitions and ambient sound to guide attention.



Fig. 2. Visual Style (Personal Documentation)

Narrative Structure. The four stories were adapted into short visual sequences without spoken narration. Each story was reduced to key actions and symbolic elements that could be expressed through shape, motion, and contrast. The Moon was used as the connecting element between the stories. The end of each story transitions into a visual of the Moon, which then leads into the next segment. This structure supports a continuous loop, allowing viewers to enter the experience at any point.

Visual Style. The visuals use geometric forms, limited colours and Indian print inspired textures (see Fig. 2). The same visual language is used across all four stories. Circular forms, shifts in brightness, repeated shapes, and gradual transitions represent events such as movement, conflict, and transformation. These shared elements allow the stories to connect smoothly while keeping the visuals simple for the CAVE environment.

Storyboarding and Animation. Storyboarding was used to plan the sequence of scenes and transitions in the 48:9 layout. Frames were drawn to understand how elements would move across the three screens and how the viewer's attention would shift within the space.

Each story was animated as a separate scene in Adobe After Effects using a 5760 by 1080 composition. Motion was kept simple and relied on basic keyframe animation and looping methods. The Moon was used as the main transition element, appearing at the end of one story and leading into the next.

All animated scenes were compiled in Adobe Premiere Pro, where pacing and audio were aligned. The final video was exported as a seamless loop and tested for alignment across the projection walls.

3.3 Technical Implementation

The technical implementation involved creating the animation, preparing it for projection, and configuring the CAVE environment. The workflow followed a linear pipeline that moved from content creation to spatial display (see Fig. 3).

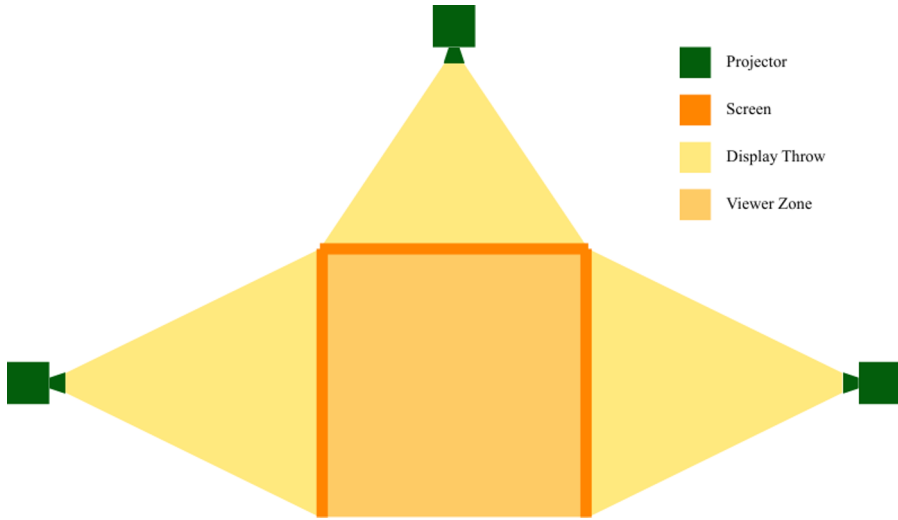


Fig. 3. Three-screened CAVE Setup Layout (Personal Documentation)

Software Workflow. The animation was created in Adobe After Effects. A 48 to 9 composition was used so that all three projection surfaces could be viewed as a continuous workspace. This allowed the transitions and movements to be planned across the three walls.

After the animation was completed, Adobe Premiere Pro was used for timing adjustments and audio placement. The final render was exported as a single video file matching the 48 to 9 aspect ratio used in the CAVE.

Projection Mapping. HeavyM software was used for projection mapping. The single 48 to 9 video was divided into three equal sections. Each section was aligned manually to the corresponding projection surface. The mapping ensured that shapes travelling across boundaries appeared continuous and that the timing remained consistent across all three walls.

The mapping layout also allowed the transitions between stories to pass smoothly from one wall to another. This was important for maintaining narrative flow in the immersive environment.

CAVE Setup. The installation was presented in a three-wall CAVE arrangement. The projections covered the left wall, front wall, and right wall. Each wall used a 16 to 9 projection, and together they formed a 48 to 9 panoramic display.

The viewer stood at the centre of the three-wall layout. The narrative moved across walls, which encouraged viewers to look around the space and follow the motion. The installation was set to loop so that viewers could enter and exit at any point.

3.4 Evaluation Method

The installation was shown in an exhibition setting where visitors entered the CAVE individually or in small groups (see Fig. 4). No introduction was given before viewing, which allowed for natural first impressions. The installation played in a continuous loop. Observations were made during each session to note how viewers moved inside the space, followed the visuals across walls, and responded to transitions. After the experience, a survey was made available to visitors. Sixteen participants completed the survey and shared responses on immersion, clarity, memorable scenes, interpretation of the four stories, recognition of the Moon as a connecting element, and any personal or cultural associations. The combined observations and survey responses were used to understand how viewers interpreted the non-verbal narratives and how the spatial layout supported this interpretation.



Fig. 4. Participant engagement within the CAVE (Personal Documentation)

4 RESULTS AND DISCUSSION

The evaluation focused on how viewers interpreted the non-verbal narratives, how they followed the sequence across the three walls, and how they related the visuals to cultural memory. The results combine observations made during the exhibition and responses from the sixteen completed surveys.

Many viewers looked around actively during transitions, especially when the Moon moved from one wall to another. This movement often guided their orientation in the space. Several participants shifted closer to specific walls when distinct shapes or actions appeared, such as the rising light in the Mundari story or the fire sequence in the

Jataka tale. These movements suggest that changes in scale, direction, and brightness played a role in directing attention within the CAVE.

Survey responses showed that most participants were able to recognise that the installation presented multiple stories rather than a single sequence. The recurring appearance of the Moon helped them understand the shift from one story to the next. Participants described the Moon as a point of return or reference across the loop, which indicates that it functioned as an effective linking element.

In the open-ended responses, participants interpreted the symbolic visuals in different ways. Some recalled similar stories from childhood, while others associated the visuals with general ideas related to the Moon, nature, or behaviour. Several viewers who experienced the installation together began discussing the scenes immediately after the loop ended. These conversations often involved comparing interpretations, recalling similar stories, and linking the visuals to familiar cultural references. This indicates that the shared environment supported collective reflection and added a social layer to the experience.

Participants also described moments that guided their movement inside the CAVE. Transitions between scenes and large shifts in direction prompted turning or repositioning. This suggests that the spatial layout encouraged viewers to follow movement rather than remain fixed in one direction.

The results suggest that viewers were able to understand the four-part structure, identify the Moon as the central link, and engage with the visuals through both movement and personal interpretation. The combination of spatial transitions, symbolic animation, and shared viewing supported this process.

5 LIMITATIONS

The installation relied on a single external speaker due to technical issues with the CAVE's spatial audio system, so directional sound could not be evaluated. The projection environment had high ambient light during daytime and two fixed ceiling lights remained on throughout the sessions, which reduced image contrast. The projection mapping was created using the demo version of HeavyM, resulting in a visible watermark on the visuals. The participant group consisted of viewers from a limited age range, and the installation followed a fixed loop without interactive elements.

6 FUTURE SCOPE

Future work can include expanding the project to other Moon-related stories and to narratives connected to other celestial bodies or natural phenomena. The approach can also be adapted to topics such as rivers, seasons, and traditional ecological knowledge. The installation can be extended within the CAVE system through interactive elements that allow viewers to influence pacing or direction, and multi-channel audio can be introduced to study how sound affects movement and interpretation. The experience can also be adapted for VR platforms to increase accessibility, while acknowledging the difference between individual and shared viewing. Further studies can include a

larger and more diverse participant group, including children and museum visitors, to understand how different audiences interpret immersive storytelling. The model can be applied in museum and educational settings to explore how immersive formats support learning and cultural engagement.

7 CONCLUSION

This project examined how a three-wall CAVE environment can present non-verbal interpretations of Indian lunar folktales and support reflective engagement with traditional narratives. Four Moon-related stories were adapted into a continuous loop using symbolic visuals, motion, and ambient sound, with the Moon serving as the connecting element across the sequence. Observations and survey responses showed that viewers followed the movement across walls, recognized the four-part structure, and related the visuals to personal and cultural references. Collective viewing also led to discussions among participants, indicating the social value of shared immersive experiences. The project demonstrates that immersive environments can provide an accessible way to revisit cultural material and explore the layers of meaning present in folktales. The approach used here can be extended to other celestial themes, traditional knowledge systems, or educational content, suggesting broader possibilities for combining narratives with experiential media.

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