



# Digital Representation of a Conceptual Leather Puppet Character using Holographic Prism Glass

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## ABSTRACT

Leather shadow puppet performances are slowly becoming isolated. They are no longer attracting the young generation towards its long duration and language complexity, inclusive of its incomprehensible storytelling and characters. To address this gap, this research utilized a descriptive qualitative method and mind map to transcribe and describe key concepts of both redesigning and avatar creation of leather shadow puppet characters. The purpose of this study was to explore an alternative method in representing leather puppet performance by implementing a holographic prism glass technique. The digital representation of a leather puppet through a holographic prism glass medium is a manifestation of appreciating Indonesian cultural artwork in the modern era. The contribution of this study is to provide a more detailed explanation of a new manner in exploring and preserving the narrative and figure of the cultural heritage.

## ARTICLE INFO

### Article History:

Received 11 Feb 2020

Revised 28 Feb 2020

Accepted 09 Mar 2020

Available online 03 April 2020

### Keywords:

Holographic prism glass,  
Indonesian leather puppet,  
Leather puppet character,  
Leather puppet performance

## 1. INTRODUCTION

Indonesian leather shadow puppet is the oldest form of motion picture storytelling performance originated in Java, Indonesia (Ismurdyahwati, 2013). Leather puppet is one of the performing arts of Javanese culture using the principle of light and shadow driven by a puppet master (dalang) capturing the narrator

(Brandon, 2019). In the Javanese leather puppet show, a puppet master is responsible for shaping, building up the nighttime performance from 9 pm to 4 am (van Groenendaal, 1986). Leather shadow puppet performances were performed in the Javanese language, with their narration and sung poetry accompanied by gamelan music and female singers (pesinden) (Prayoga, 2018).

Over the years, Indonesia's rapid pace of change has affected the growth and practices of leather shadow puppets, which drove the younger audience away from its performances (Lim, 2014). Nugroho (2019) argued that leather shadow puppet performances as a traditional artwork have undergone a continual change in accordance with the development of its community. Based on Lim's (2017) study, a new form of puppetry by using the Indonesian language in the performance seems to unmoved the younger generation, identified by the low number of their presence at the shows (Lim, 2014).

The show of a leather shadow puppet can be enhanced through a mixture of traditional art forms combined with new media programs. With this opportunity, new media experts were trying to explore the possibility to organize live performances on screen-based media or electronic screens (Ramli & Lugiman, 2012). One of the current tools to enrich a cultural heritage object is holographic projection mapping (Lee *et al.*, 2019). It allows to freely-move naked eye participants to share a three-dimensional object with fully continuous, observer-independent, and parallax (Monaghan *et al.*, 2016).

The purpose of this study was to explore an alternative method in representing the leather shadow puppet by implementing the holographic prism glass technique. Using the holographic prism would lead to a decrease in the overall size of the prism which increases the sensitivity and accuracy of the measure (Ivanov *et al.*, 2017). The digital representation of the leather puppet through holographic prism glass medium is a manifestation to appreciate Indonesian cultural heritage in the modern era. In addition to that, it is necessary to make sure the traditional art form to be relevant.

## 2. METHODOLOGY

This research implements descriptive qualitative methodology. This method seeks to minimize the interpretation of data in order to reflect a more accurate narrative account from the perspective of audiences or participants (Hawkins, 2016) and describes a phenomenon and its characteristics (Nassaji, 2015).

Another common method to generate visual qualitative information is to use a concept map or mind mapping, which is a technique of representing knowledge by organizing it as a network or other non-linear diagram (Poon & Liu, 2014). In addition, mind maps feature tree-like branches of information that display key concepts as well as relationships between ideas (Mandal, 2014).

The character in this study was created as a figure to not only entertain but also as valuable learning and guidance for the audience in order to understand the narratives and storytelling (Lim, 2014). Therefore, the process of creating a puppet character was divided into two concepts: redesigning a character and creating an avatar. Redesigning characters is a process of rebuilding existed characters. Whereas, creating an avatar is a process to develop a new character that embodies the creator. Thus, there is a difference in the process of research and collecting data for both redesigning and creating an avatar. Comprehensive data collection and analysis are essential for the remaking of a character (Crossley, 2019). On the other hand, an avatar is a graphical representation of concepts or ideas of a person (Nam & Park, 2009).

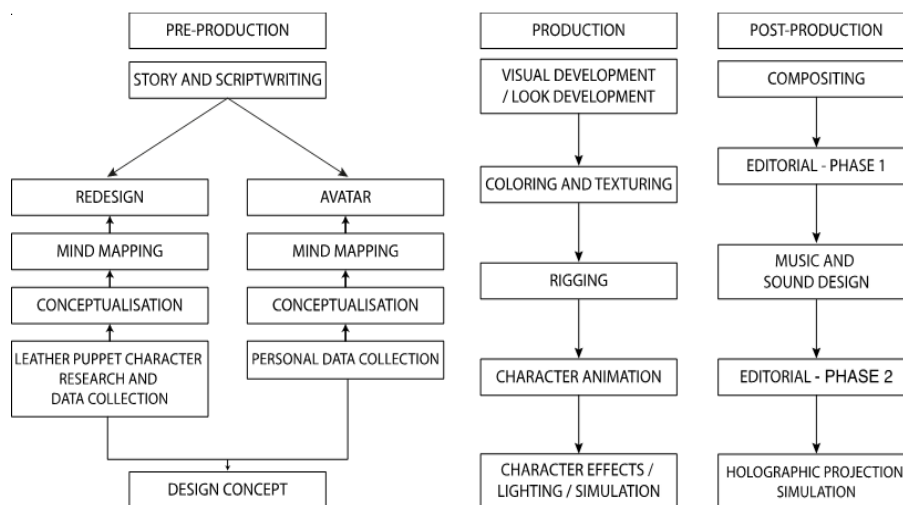
In order to inspire the younger generation while appreciating Indonesia's cultural heritage, this digital representation by applying holographic prism glass is considered a new potential medium in puppetry performance. Many different

approaches and special techniques have been developed in relation to holographic projection to reinforce its efficiency and broaden its area of applications. First, the holographic idea is based on the wave nature of light. It was initiated by Denis Gabor and later continued by Emmett Leith who made the first hologram of a three-dimensional object with the invention of laser (Poon & Liu, 2014). Three-dimensional holographic projection technology based on illusionary technique is called pepper's ghost – a reflection of an object positioned behind audiences that appear in front of them – which was first used in Victorian theatres in the 1860s (Gabor, 1948). The digital version of pepper's ghost illusion replaced the source object with a display image generated by computer graphic and digital screen located outside of the stage, i.e., Gorillaz show at MTV Europe Music Awards in 2005 and 48 Grammy Awards; virtual performance of Tupac Shakur at Coachella Valley Music and Arts Festival in 2012 (Ramli & Lugiman, 2012).

This research implemented computer-generated holography by using a pyramid-type floating projection system.

Three-dimensional visual perception is projected as a dynamic floating image through a pyramid structure using prism glass material. There were four display areas of prism glass used to show figures or objects and transform angle-of-view to achieve a 360-degree viewing angle.

There were three basic stages of preparing digital visual image or video content to be projected as a holographic image: pre-production, production, and post-production (**Figure 1**). During the pre-production phase, all the planning took place from story and scriptwriting to concept design of redesigning and creating the avatars. The second phase was the production process of content creation. This process developed a visual image, requiring coloring and texturing. Furthermore, actions of rigging, lighting, effect, and simulating apply in animating the characters. Video content organizing happened in the post-production phase which comprises compositing, music and sound designing, and editorial workflows in order to provide visual imagery workable to be projected as a holographic image.



**Figure 1.** Three basic stages of preparing a digital visual image

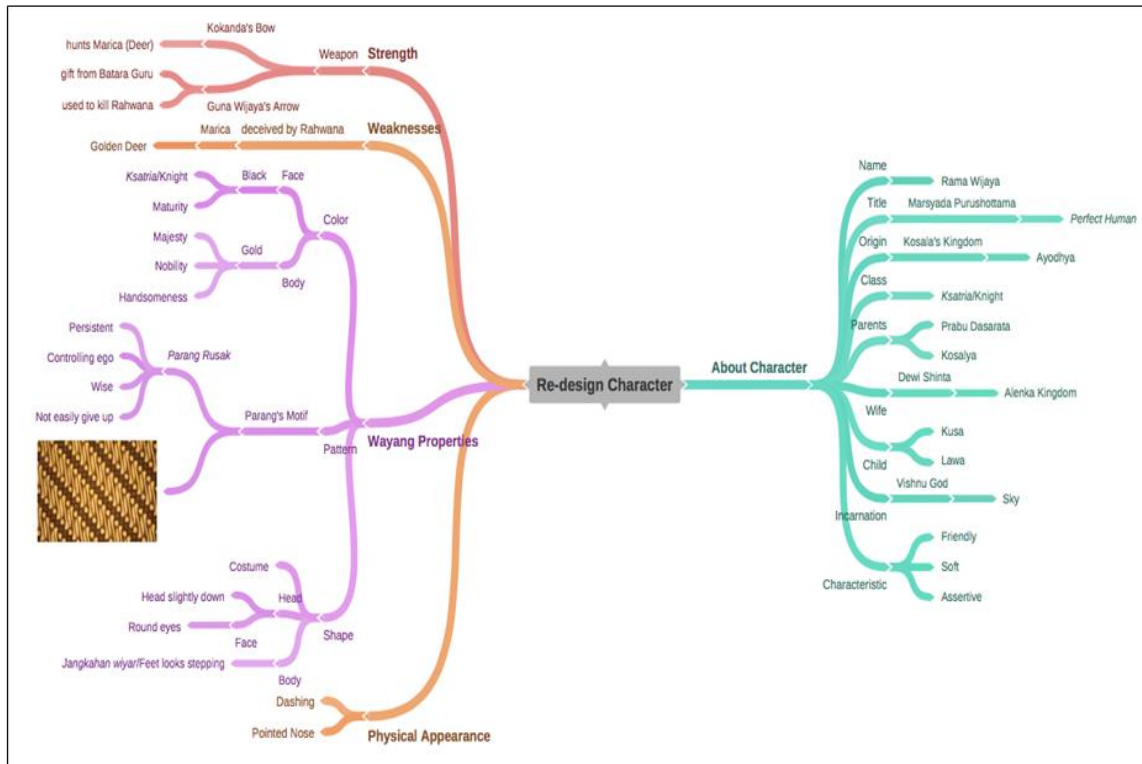


Figure 2. Mind Map: a redesigned character of Ramawijaya



Figure 3. The redesigned character of Ramawijaya

### 3. RESULTS AND DISCUSSION

#### 3.1. Pre-production

The pre-production process begins with story and scriptwriting preparation for the visual representation of the leather shadow puppet on both redesigning the characters and creating the avatars.

Redesigning a leather puppet character is a process of re-creating an existing character of the leather shadow puppet.

In his study of world hero myths, Campbell (2008) discovered that they are all basically the same story – retold endlessly in infinite variations. One of the legendary heroic characters in the leather

shadow puppet is Ramawijaya, a powerful knight with a compassionate heart (Campbell, 2008). Ramawijaya is the re-created character by his appearance without constructing his authenticity of personality (**Figure 2**). Ramawijaya, known as Rama, was a famous legendary King of India and the descendant of the Surya Dynasty (Suryawangsa). Ramawijaya was originated from the ancient kingdom of Kosala with its capital, Ayodya. According to the core belief of Hindus, Rama was the seventh incarnation of Lord Vishnu, voluntarily descended to promote wealth and welfare of mankind (**Figure 3**). Ramawijaya was a compassionate warrior who used his rigorous training for the benefit of his people while resisting the temptation to use his power for personal gain. Ramawijaya's expertise was in his weapon of choice – the bow and arrow – no other warriors were able to overpower his skills in archery. He could arc many sizes of bow and aim precisely at any far-distance target.

In order to convey emotional information and insights that would be difficult to induce or explain in a non-fictitious setting, the design alters ego can provide a projection upon an idealized version of, in this case, the heroic character in Ramawijaya (Triantafyllakos *et al.*, 2010). Avatar is defined as the embodiment of the user in virtual environments (Ducheneaut *et al.*, 2009). It is known that people concentrate easier, learn better, and find virtual communication more enjoyable and fun using avatars (Gaggioli *et al.*, 2003). Past studies on avatars and agents indicated that people get more emotional access to computer-based environments by communicating with an avatar (McQuiggan & Lester, 2007). The avatar selected in this study was Ki Mas Aditya Adanu, coming from a story-driven approach and ethically

nuanced of Palembang, South Sumatera (**Figure 4**).

Ki Mas Aditya Adanu (the Prince) was the son of Raden Wijaya and Raden Ayu Sri Muliya, King and Queen of Seguntang Kingdom. The sacred name of Ki Mas Adanu was named after the source of his archery skills. There are several definitions of Danu, i.e. in the Indonesian language, Danu means forceful arc; in Javanese language, Danu portrays a charming personality as a Son of Light; Adanu in Sanskrit which means the light of the sun (**Figure 5**).

### 3.2. Production

A production phase is where the actual work starts according to the design concept, including several major actions of the visual/look development, coloring and texturing, rigging, animating, and lighting.

Once the model of redesigned-character and avatar of leather shadow puppet has gone through major actions, the rigging and preparing for animation and rendering will follow. The rigging technique specifically refers to the process of creating bone structures. In addition, rigging is a series of adding controllers and automation to the character model. Hence animation and imitation movements of a puppet show through a series of interconnected digital bones can be achieved (**Figure 6**). The character models were rigged prior to being animated to enable them to deform and move around.

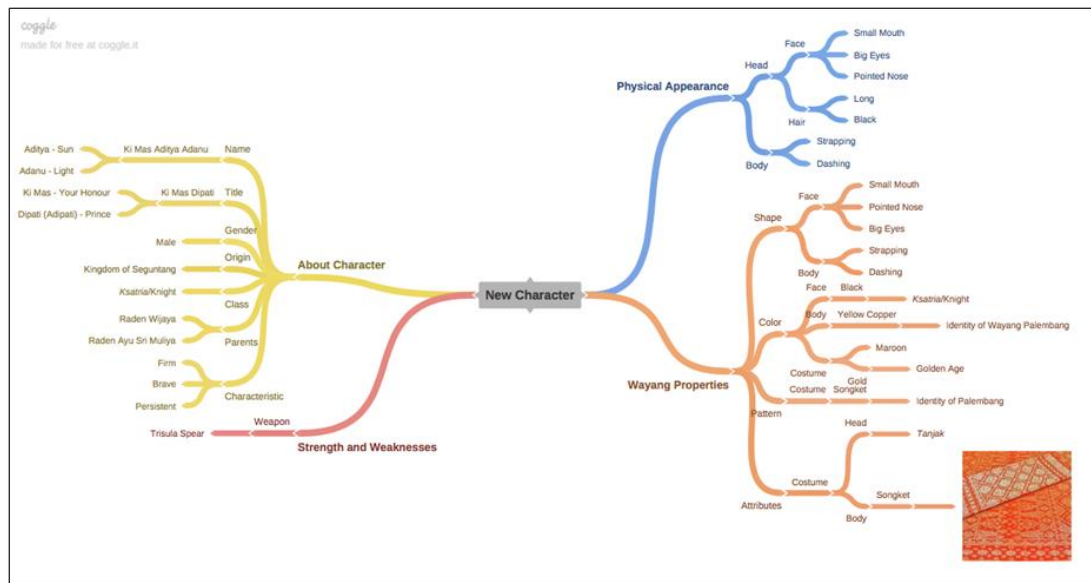


Figure 4. Mind map: Avatar of Ramawijaya



Figure 5. The avatar, Ki Mas Aditya Adanu

### 3.3. Post-production

Post-production is the final stage of creating holographic video content. This phase also involves advanced processes, i.e. compositing, editing, music and sound design, holographic projection simulation.

For a real-time holographic video using computer graphics, it is important to generate rigged animated character models into a display movie animation. The display movie animation itself comprises four-mirrored video in different layers of compositing, which consequently will re-

produce the depth cues in the human visual system and create a unified percept of three-dimensional projection (Figure 7). It is also necessary to test the holographic video simulation to produce a seamless final content. After compositing has been completed, sound editing was the next process to integrate holographic video with music or sound effects in a symbiotic relationship. According to Damasio (2000), fine human emotion is even triggered by cheap music and cheap movies, the power of which should never be underestimated. Hence, emotions would

need to be triggered by what the listening-viewer was hearing. This holographic video embodied instrumental music, i.e. Ramayana battle soundtrack to consider the listening mode of casual listening for

the audience. Chion (1994) stated that casual listening is the first state of listening to a sound to gather information about its cause or source.

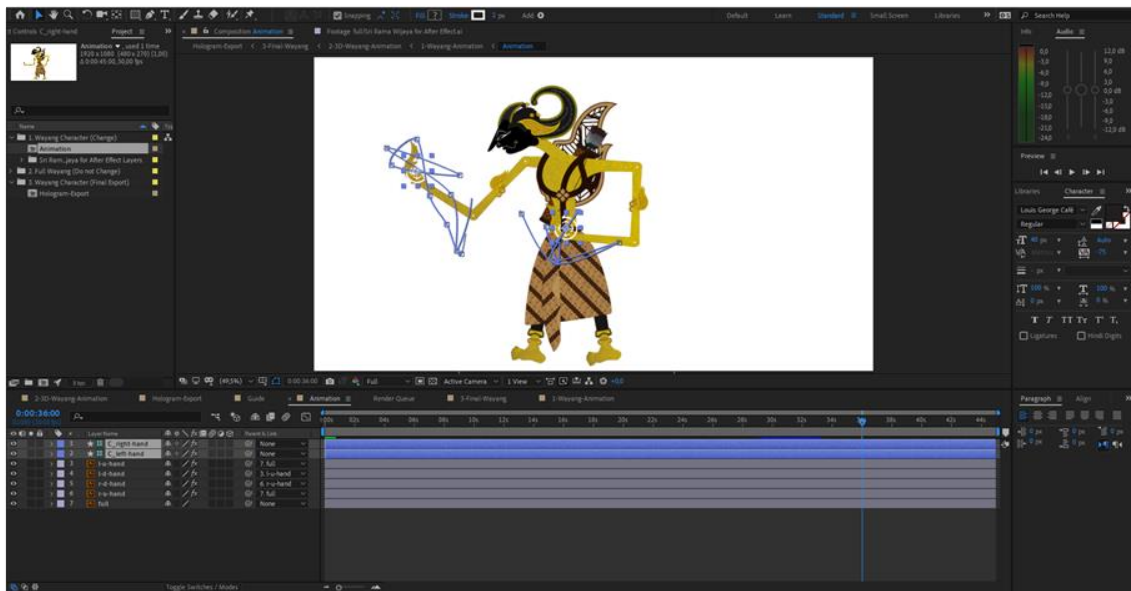


Figure 6. Rigging process

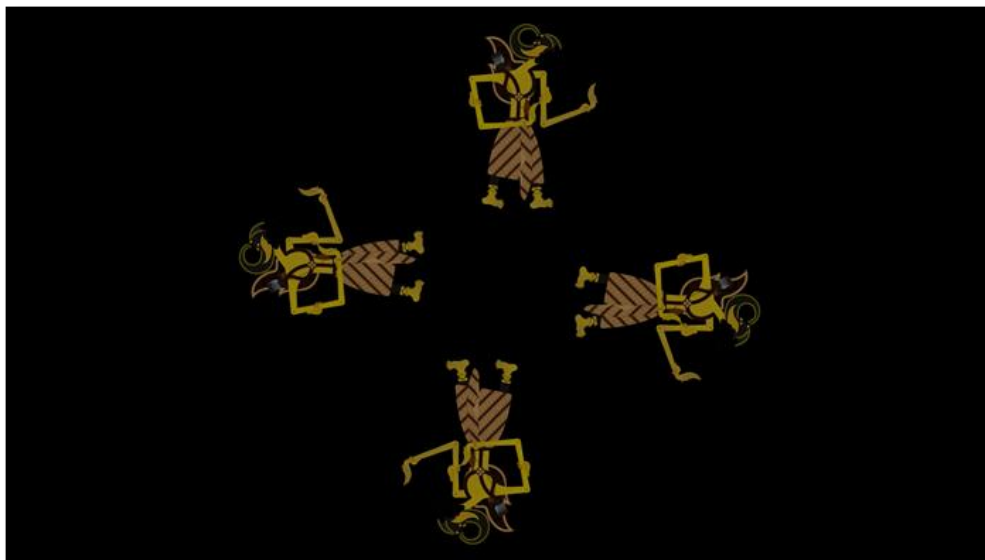


Figure 7. Four-mirrored video compositing

Editorial (Phase 1) is a crucial stage to ensure the smooth flow of the holographic video to achieve the design concept's intention. Editorial (Phase 2) is the last editing process, which is to unify music or

sound to holographic video and to generate the final holographic video projection. Holographic prism glass was the medium being used to project the final digital representation of a leather puppet character.

The type of prism glass was afloat glass which will affect the clarity on displaying the reflection of the projection from the monitor screen.

The four images of animated leather puppet characters will be projected to prism glass through the monitor screen in order to produce a three-dimensional

perception of dynamic floating images. The projection of four-image display surfaces of prism glass within pyramid structure will present distinct information and switch angle-of-view into a 360-degree viewing (Figures 8, 9, and 10).

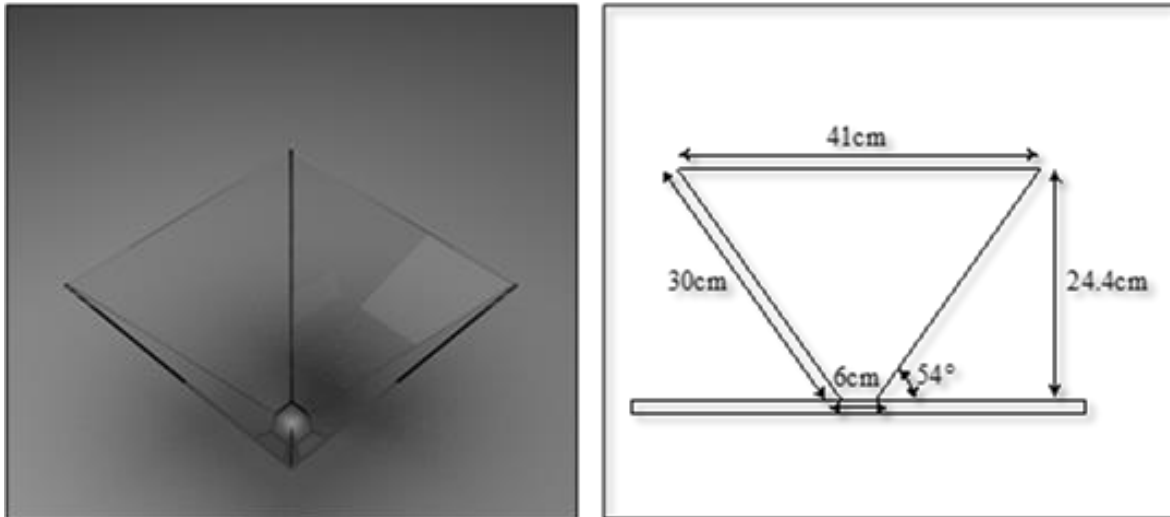


Figure 8. Prism glass

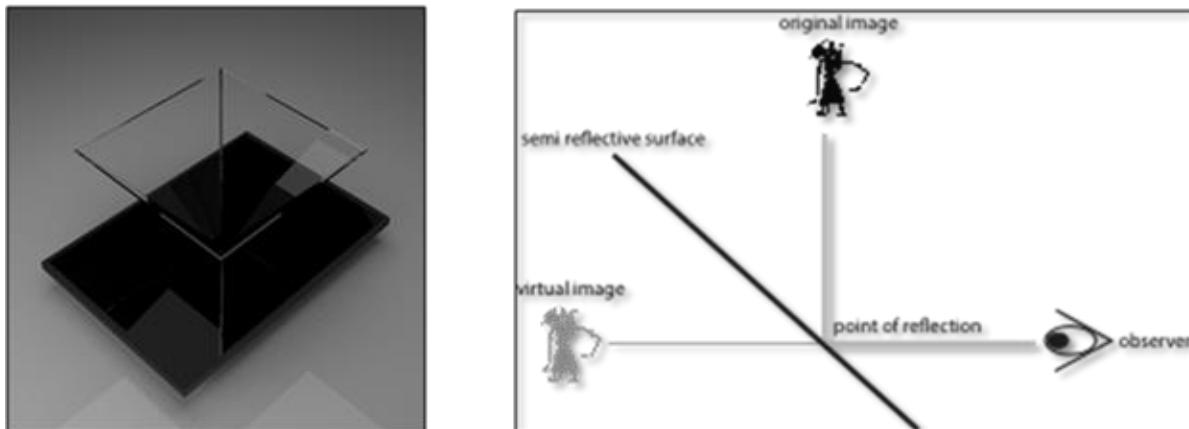


Figure 9. Holographic prism glass technique



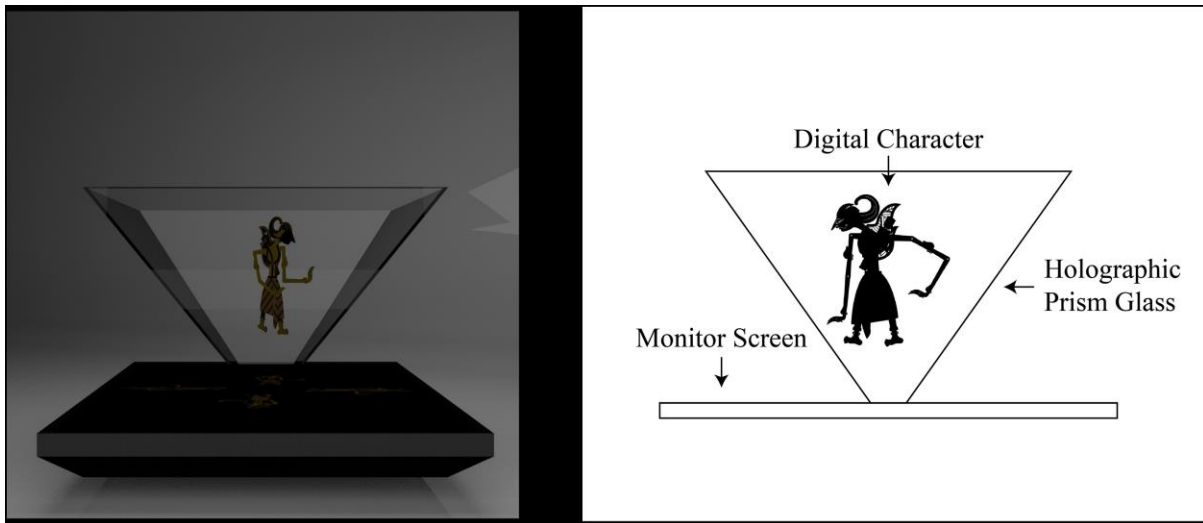


Figure 10. Holographic prism glass projection

#### 4. CONCLUSION

It is evident that we are experiencing the abandonment of Indonesian traditional arts by the young generation. The rise of new media and other (communication) technology devices, i.e. television and cellular phone have generated massive changes in the social behavior of appreciation and values of young people towards leather shadow puppet as Indonesian traditional puppet performance. Leather shadow puppet has become an inseparable part of Indonesian, Javanese culture particularly, and traditionally, the performances presented by a puppet master using screen and lantern as a light source to create shadows of leather puppet on screen. A puppet master delivers stories from Hindu epics and a combination of philosophical concepts and mes-

sages related to the moral and ethical values of life. The long duration; the complexity of language in storytelling and characters; and a convenient way of showing the performance, have no longer attracted the young generation in leather shadow puppet exploration as an appreciation to Indonesian traditional arts.

The holographic prism glass technique in leather shadow puppet performance is a new approach using technology in order to advance the leather shadow puppet performance in the modern era. The digital representation of a leather shadow puppet character shows the ability to encourage and motivate young people in exploring its narratives and figures through the transformation of traditional performance into an immersive and more entertaining experience.

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