

# MULTIMEDIA BASED LEARNING AND VIRTUAL TOUR FOR PERFORMING HAJJ

Zeeshan Bhatti, Ahmad Waqas, Hafiz Abid Mahmood Malik

**Abstract** —*Hajj is one of the five pillars of Islam that is performed every year during Dhul-Hajjah in Holy city of Makkah, Saudi Arabia. Despite of best efforts of the management, pilgrims from round the globe face difficulties for performing important rukuns of Hajj because of their first visit to these places. This paper presented a multimedia based model for prior learning the important places and performing rukuns associated with them. To develop this virtual tour for performing Hajj variety of software tools are used that include Photoshop, after effect, 3D Studio Max and Premier.*

**Keywords:** *Virtual Training, 3D Animation, Performing Hajj*

## I. INTRODUCTION

Hajj is one of the obligatory pillars of Islam and is performed every year by the persons who can afford it. Every year 3.5 to 4million Muslims perform hajj during the Islamic month of Zul-Hajj. It is a complex ritual involving many steps and the procedures spread over more than 10 days. Since, it's a complex and cumbersome process, for which many books and tutorials are available to understand and guide the individual about each steps of hajj. However, these books are written with so much technical details, that an ordinary person fails to understand and rely on a physical guide during the hajj performance. Therefore, there was extreme need to design a multimedia based Virtual Tour, that would illustrate and visually guide the ordinary first time hajj

performer about the various steps and procedures of performing Hajj. In this paper, a 3D animated virtual guide of various steps to perform hajj is presented for easy understanding.

Animation and Multimedia have been widely recognized and acknowledged for promoting and enhancing the capabilities of the learners for understanding the subjects, in various ways based on cognitive theory of multimedia learning [1]. Instructional tools and environments based on Multimedia content, immensely increase and improve the potential of people towards learning [2],[3],[4]. Through Multimedia and Virtual reality, a learner can be motivated and encouraged to learn and understand complex phenomenon and process very easily and in an intuitive way [5]. The aim is to get a better understanding of how to perform Hajj. To achieve this objective, a multimedia based learning and knowledge base was produced which provides facility to learn the process of Hajj.

### a. The Hajj

Hajj is performed in the holiest city of Saudi Arabia named 'Makkah'. It is performed in the 12 month of Islamic lunar calendar i.e. Dhul-Hijjah. Hajj starts on 8<sup>th</sup> Dhul-Hijjah and lasts for five days. Millions of Muslims get the opportunity to offer this virtuous act every year. It is one of the five mandatory pillars of Islam. It is required as a religious duty for the adult Muslims who have the physical and financial ability to perform this at least once in lifetime. Pilgrims follow the footsteps (Sunnah) of Prophet Ibrahim (A.S) and his family. Below are the steps which start from the 8<sup>th</sup> Dhul-Hijjah and ends till the evening of 12<sup>th</sup> Dhul-Hijjah [13][14][15].

In figure 1, the Hajj process is summarized step by step:

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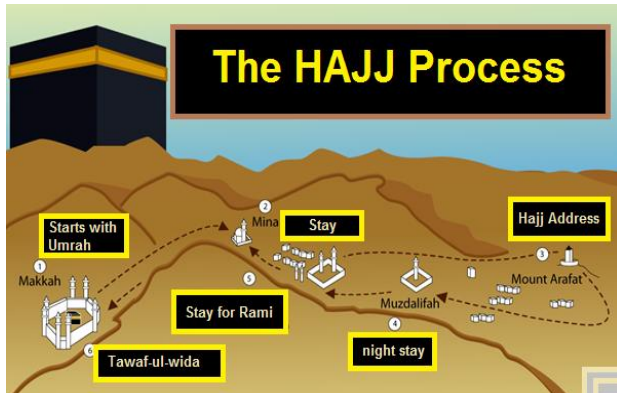


Figure. 1: Summary of Hajj process

## II. RELATED WORK

Multimedia has been contributing for better learning and understanding of various complex phenomenon. Ahmed (2015) used 3D Animation to express and spread a message that you should not drink and drive [6]. Similarly, Othman (2015) developed a multimedia learning application (MLA) to raise awareness about sexual abuse amongst children [7]. McComas (2002) and Glang (2005) used multimedia tools to teach about pedestrian safety [8],[9]. Moreover, Rawi (2015) discusses a novel multimedia interactive application to teach and educate children of Malaysian schools about road safety [10].

## III. SYSTEM ARCHITECTURE

The architecture of the multimedia based learning system involves developing of an animated and interactive video that would contain text, audio, images, 3D animation, and last but not least video rendering. This was performed using various multimedia tools and plugins such as, Photoshop, Aftereffects, 3D Studio Max and Adobe Premier. The basic system design and flow is illustrated in figure 2.

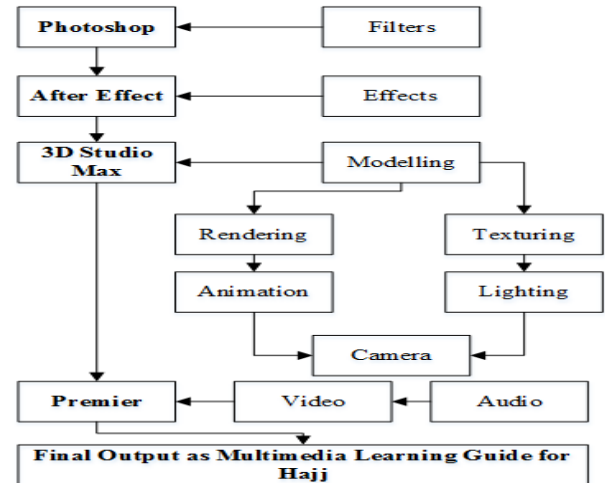


Figure. 2: System Design

## IV. DEVELOPMENT METHODOLOGY

### a. Modeling using 3D Studio MAX

The development started by first acquiring all the maps and images of various location of Makkah. Reference sketches were created based on those images for modeling purpose. A 3D model of all the main architectural building and locations was created in 3D Max. Polygon modeling technique is used to model the architecture. The most significant and important part of this system was the model of Khane-Kabba shown in Figure 3. 3D Studio Max was used to create a single 3D Max file by performing six steps after the processing of After Effect.

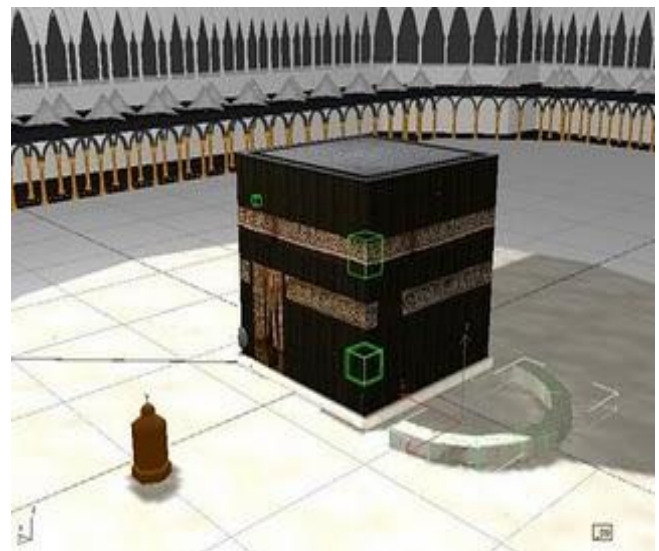


Figure. 3: Modeling, Texturing, Lightning and Camera effects of Kabba

A simple box was used with polygon modeling tool to model the house of Kabba and then it was textured using the original Kabba source images. For the

background of the Kabba, simple low poly approach was used, similar to game modelling, where low polygonal models are used with accurate textures. In Figure 4 different steps of 3D Max Modeling, Texture, Lighting, Camera and Animation are used. Similarly, all other key holy places were modeled and textured using combination of high-poly and low-poly approach with accurate textures obtained from original images of the actual places of Makkah as shown in figure 3 which shows the Makame-Arafah, whereas figure 5 shows the tents of Mina.

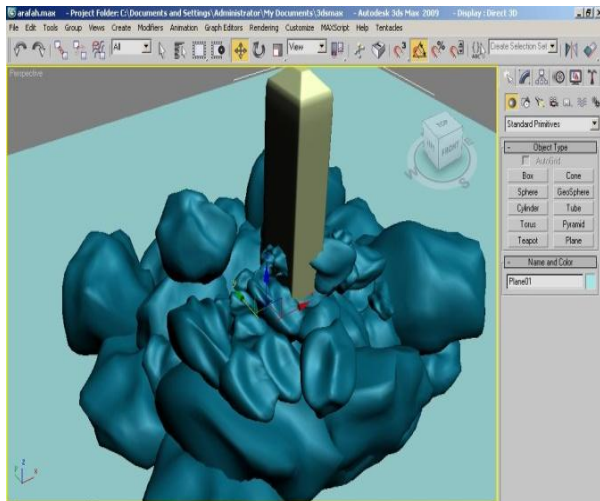


Figure. 4: Model of Arafah

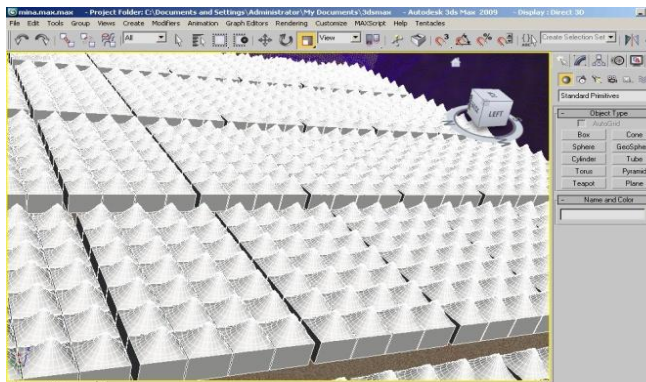


Figure.5: Model of Mina

#### b. Texture

After modeling the Material and shaders were assigned to each of the models using the default material editor of 3D Max as shown in figure 6. Each texture for the models was used from the original images of actual locations and places that each model represents. This way, our models highly resembled with the actual building, as shown in Figure 6.

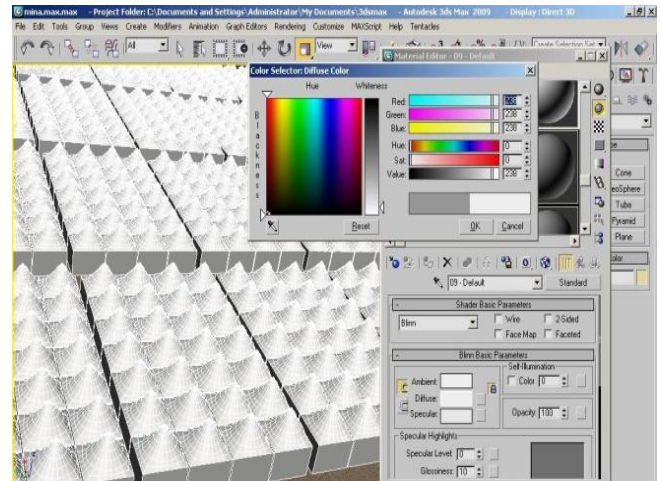


Figure .6: Material Editor for Mina

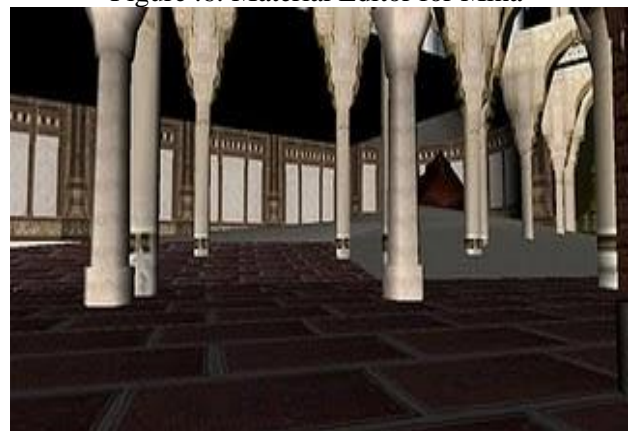


Figure.7: Actual Building

#### c. Lighting

Lighting is the most crucial part of 3D virtual environments. Through lighting the actual realistic look and feel can be obtained. For this purpose, global illumination technique is used to light up the entire scene with realistic light, and creating accurate shadows [6] as shown in figure 8.



Figure.8: Lighting Effects

For some of the scene and exterior locations, with lots of geometry and polygonal objects, we



simply used the Sky Portal light and change the color to light sky blue. Then we placed several other Omni lights in the scene to create an artificial light dome effect, rendering the output as a globally illuminated scene as shown in figure 9.

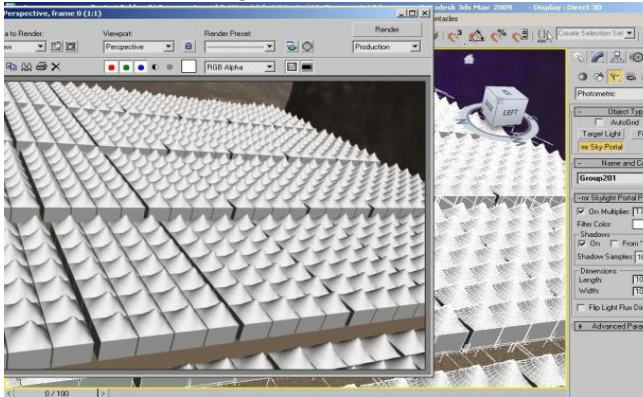


Figure.9: Lighting Effects of Mina Model

#### d. Camera and Animation

Camera was added in the last stages to create the virtual tour and a learning experience. Initially, the standard aim-camera was used and rigged with special techniques as discussed in [12] as shown in figure 10.

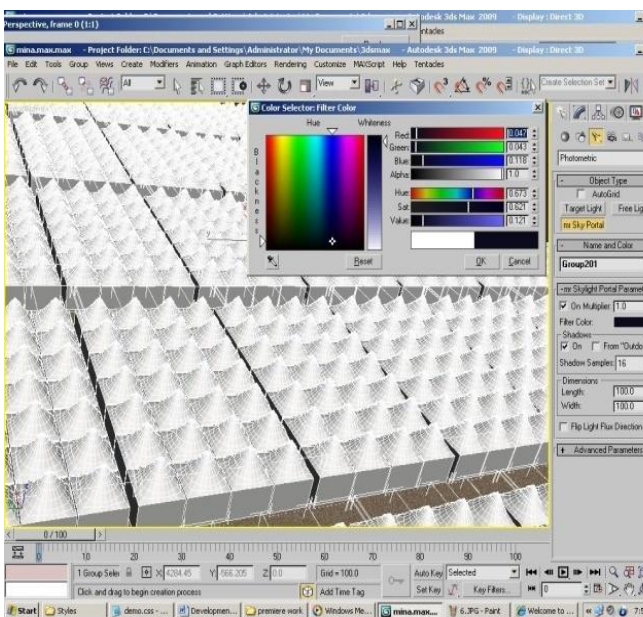


Figure.10: Shows the lighting and camera

#### e. Rendering

Rendering is the process in which final output is generated. The final output is used in the final multimedia based learning and tour system. The rendering process used the default Scanline algorithm

built into the 3D max rendering system, with production quality settings as shown in figure 11.

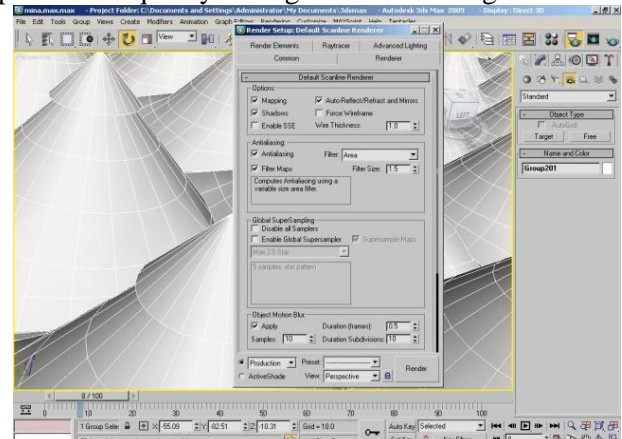


Figure.11: Rendering of Mina Model

Once the discussed settings have been applied, and all text renders have been done to check the quality and output setting of the models and environment, the final batch render of each scene file is done as shown in figure 12.



Figure.12: Batch Rendering Process

#### f. Specify Process in Premier

During the development, Adobe Premier was used after 3D Max, Aftereffect and Photoshop. Premier is used to combine all the files and give the final output as a video as shown in figure 13.

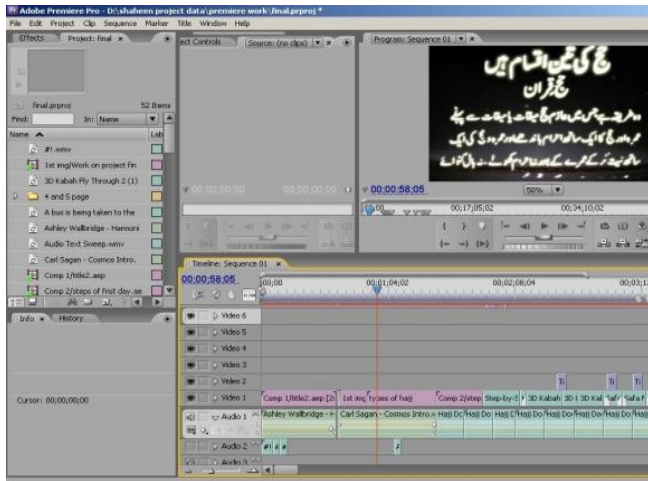


Figure .13: Video editing in Premier

To do this, Photoshop and different images are used and position was set using Key-frame and Camera as shown in figure 14.

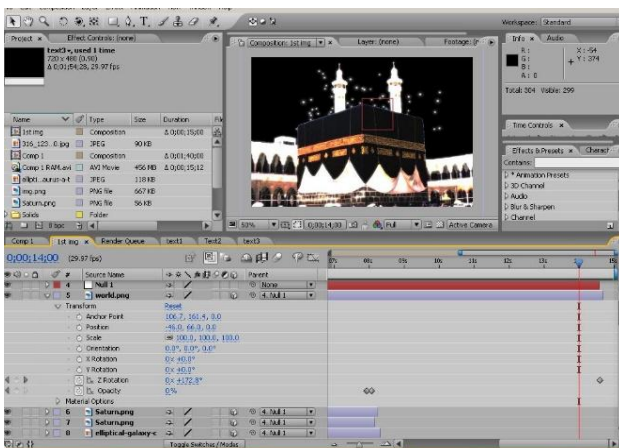


Figure.14: Particles around Kabbah

In this Figure, first position of image was set then Camera is used. Then a new Solid layer is created and Effect Particles is applied, after that, value of Gravity is set along with other Options as shown in figure 15.

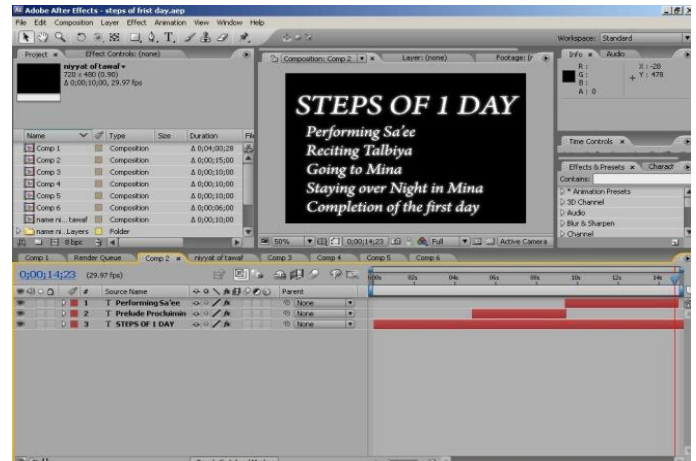


Figure.15: Steps of First Day

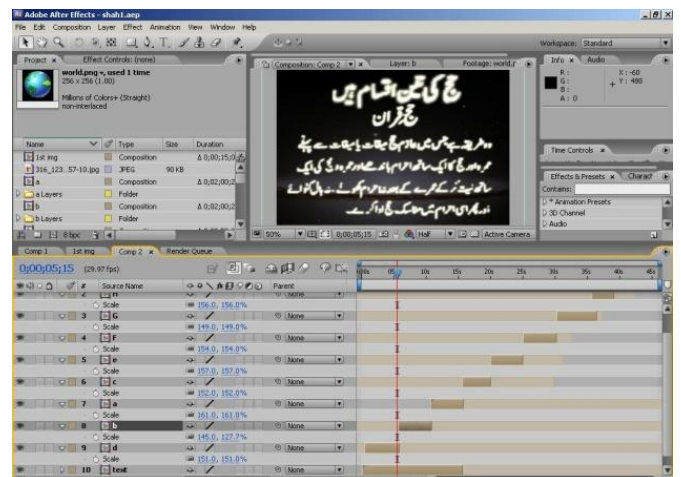


Figure.16: Combination of videos in After Effect

First of all, Text tool is used to write text then applied Blur and Fast Blur Effects. The Mask is applied and value of Mask was set using Key frame. Then, create all composition of Text and apply the same Blur to all text and Fast blur then apply the Mask after this process, create a new composition then set to all the same composition and finally set the position.

Figure 16 shows the combined video, which includes importing the video then put the timeline and set using the giving tool and set using Option and set the value using Key frame.

After completing the process of combining video and all files, finally put the sound and set the pitch value using the tool and option and set the values.



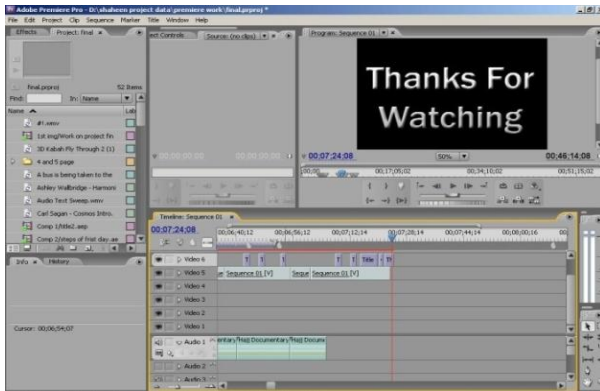


Figure 17: Shows the thanks for Watching

## V. CONCLUSION

The aim of this study was to design and develop a Multimedia based Learning and Virtual Tour for Performing Hajj. This facilitates with multimedia guide of learning how to perform Hajj along with virtual tour of various key phases and rukuns. Online Guide of Performing Hajj is glorious as it offers multimedia based learning and virtual tour for Hajj. This multimedia based learning guide of performing Hajj is fulfilling and following the complete knowledge and guide of Hajj and that will help the Muslims and will minimize the difficulty while the performing Hajj.

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