

Edutainment - Thai Art of Self-Defense and Boxing by Motion Capture Technique

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Abstract— Thai boxing is a heritage of Thailand. We were interested in doing a research on the development of edutainment concerning Thai martial arts and self-defense in order to give both knowledge and entertainment at the same time. There were 30 postures (double posture) of Thai boxing exercises. The edutainment was designed to gain attention from the learners by using 3-dimension characters, scenes, sounds, animations, emotions, interactions, movements, virtual reality, and simulated situations. The motion picture was captured using 9 optical motion captures to record the data about the right movements performed by 2 experts in the art of self-defense and Thai boxing. This was done at the same time and there was no obstacle to perform dangerous postures. The results revealed that the edutainment helped the learners gain interest in Thai culture, the right exercise postures, physical activities, self-defense techniques, and entertainment for the learners who majored in physical education at the good level.

Keywords- Edutainment; Thai Boxing; Motion Capture; 3d animation

INTRODUCTION

Edutainment is a combination of Entertainment and Education [1]. Computer is then used in developing learning material for both instruction and entertainment like Multimedia Education, Animation and Games which simulate situations based on the contents about education and combined with fun activities. Edutainment and techotainment have been radically transforming the relationship between learning and playing [2]. These activities encourage learners to develop their behaviors in social, emotional, physical as well as intellectual dimensions. In order to make edutainment or games for education successful, it requires great care and attention in designing the structure for the edutainment development.

Thai boxing or Muay Thai is a cultural heritage of Thailand. It can be considered as a kind of national arts. In the past there were many wars between Thai and other neighboring countries. Therefore, Thai males had to master Thai boxing skills with other weapons. Later, Thai boxing evolved as one kind of Thai martial arts and self-defense with its unique characteristics. The movements and the postures are beautiful with grace yet strong and fierce. Thai boxing can be mastered for strengthening the body and as a profession.

According to the importance cited above, the researchers were interested in studying and developing edutainment in the 3-D form by using motion capture technique. The edutainment was developed in a virtual way along with entertainment. This could gain attention as well as give knowledge about Thai martial arts and self-defense to support and conserve Thai culture so that Thai boxing still exists as the saying that “Thai boxing is a world heritage” [4].

MOTIVATIONS

For the general people and even sportsmen, exercises can be dangerous if the practice is not correct. Before getting an exercise, therefore, right method and proper practice should be studied first in order to avoid dangers. Thai martial arts and self-defense are another kind of exercises. There are about 30 postures and these are the basics for modern boxing. Most Thai boxers practiced and mastered Thai boxing before participating in competitions. Olympic winners like Somrak Khamsingha and Somchit Jongjorhor are examples for international amateur boxers representing Thailand [5]. Therefore, proper practice can help people get reputation for themselves and their nation. The researchers would like to develop edutainment with

virtual reality to give knowledge about Thai martial arts and self-defense and to conserve Thai culture.

EDUTAINMENT FOR SOCIAL DEVELOPMENT

Edutainment is a kind of learning inside entertainment. This is a combination of communicative theory and educational theory, in other words, this is an art of communication. In fact, this kind of entertainment and education has existed before like in Latin America, there were a series of television programs about family planning which focus on and communicate the information on health for the general public. The core philosophy is Education through Entertainment [6]. As for Thailand, the digital content and game industry are growing and maturing rapidly due to the support from the government in terms of business and society [7].

Edutainment originated from the approach in the development of virtual science museum, movie theaters and theme parks, web virtual reality, game technology for edutainment and virtual heritage and the like. The cultural heritage area could benefit using digital storytelling and interactive multimedia opportunities in e-presentation of cultural artifacts [8].

At present, the experts in multimedia and graphic art lovers as well as game developers are interested in developing a form of learning through activities whose objectives are to give both pleasure and knowledge at the same time. Examples are games for education, television programs, movies, music, web sites, multimedia, animation and software. These can gain interest from learners and give learning experience which is considered as an educational innovation in the modern world.

As for activities which lead to the social development, edutainment can help communicate the information on health, the knowledge about drugs [9], the facts about children, history, arts, national heritage and culture, to name a few.

THAI ART OF SELF-DEFENSE AND BOXING

Thai arts of self-defense and boxing means a set of postures featuring fists, feet, knees and elbows for attack and defense during a fight. These postures must be practiced for mastery through basics in using and controlling fists, feet, knees and elbows separately. After each organ can be used skillfully, a combination of fists, feet, knees and elbows must be practiced. This is an art due to the fact that Thai masters in the past normally developed and made their own variations in the postures for more effective results. The postures were named according to the characteristics so that they could be well remembered. At present, there are 30 postures.

Thai boxing will be efficient based on the principle that the defense needs stable, strong and upright standing. Arms must be ready for attack and defense. Chin need to be

hidden like a fortress. Front foot must face onwards and place only half weight on the sole. Back foot is diagonal, wider than shoulders and place only a fourth of the weight on the thumb. The movement must be done by dragging back foot along, ready to deceive, move in, out, defend and attack. Thai boxing is not only strong but the fighters must also have the spirit of gratitude, mildness, friendship, patience, forgiveness and merry.

In late Ayuthaya Period, Nai Khanom Thom, a Thai famous boxer, won 10 Burmese boxers continuously without rest. This victory made Thai boxing famous and well-known by foreign countries for the first time. Therefore, Nai Khanom Thom can be considered as “Father of Thai Boxing” and the Day of Thai Boxing is 17 March each year.

At present, there are only 2 Thai standard boxing rings: Ratchadamnoen and Lumpini. On holidays, the competitions on Thai boxing will be broadcasted live in Channels 3, 5, 7 and 9 for nationwide viewing.

TECHNICAL IMPLEMENTATION

Implementation steps could be summarized as follows:

- **Design Character and Background**

In the first place, concept art about characters and scenes had to be studied and reviewed so that Thai characteristics could be seen in the edutainment. The costume had to be relevant to Thai martial arts and there were tattoos on the bodies as this was practiced by Thai males in the past.

- **Modeling**

Characters were created in 3 dimensions using Autodesk MAYA 8.5. Texture was added using UV maps and painted in Adobe Photoshop. The mapping texture was done on models. Joints were added inside and were named according to the joints of Autodesk Motion Builder. Joints were combined with the models using Bind Skin and exported as .FBX file so that the models could be used with Autodesk Motion Builder.



Figure 1. 3D Modeling was done and texture was added

- **Motion Capture Technique**

Motion Capture Technique was used to capture 2 actors who wore outfits with markers on 42 spots on all

their bodies. They demonstrated 30 postures of Thai martial arts and self-defense. The clip was recorded using 9 optical motion capture cameras (www.motionanalysis.com). In fact, 12 or 24 cameras should be used to get more details. Each posture was saved in one file as .TRB file in order to become raw data. Then the data were cleaned. Due to the fact that there were 2 actors, the data had to be cleaned separately. The missing parts of markers had to be revised so that the data were complete. Then the data were exported as .C3D file so that the data could be used in Autodesk Motion Builder.



Figure 2. Actors in their Outfits with Marker set

- **Animation**

The .C3d files whose attributes were the data about the movements were imported into Autodesk Motion Builder and then each .C3D file was linked to each actor. The actors could move in the same way as the marker spot due to the 'Active' command.

The modeling which was exported as .FBX file by Autodesk MAYA 8.5 was imported into Autodesk Motion Builder. The model was also characterized so that the names of the joints between two programs were similar. After that, animation could be created.

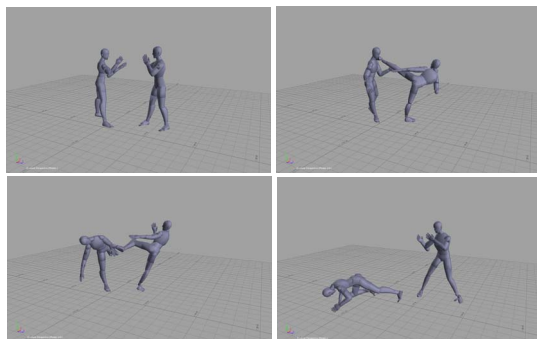


Figure 3. The .C3D file was linked to actor.

Afterwards, the model was set by the 'character setting' menu. The type was inputted as actor and the 'Active' command would make the model move according to the actor. The data were plotted and linked to the model in the form of Control Rig so that the key frame of the model could be edited in case there were errors in the movement. After the key frame was edited, the skeleton was plotted and

saved as .FBX file. The file could be used in Autodesk MAYA 8.5.

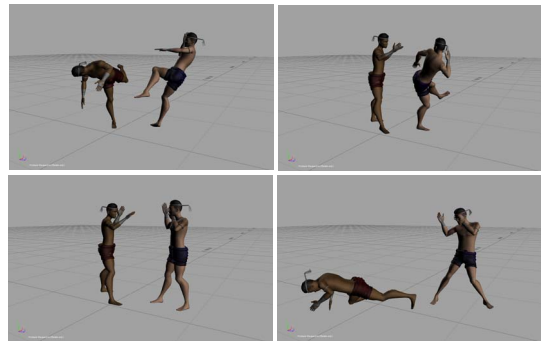


Figure 4. The data from the actor and the model was in the form of Control Rig.

- **Lighting and Rendering**

The .FBX file was imported into Autodesk MAYA 8.5. The composition of background and character would be made. Moreover, lighting and rendering needed to be done.

- **Composition and Editing**

The image files from Autodesk MAYA 8.5 were edited in terms of composition again. Then they were rendered as video files to be edited in the program. Sound effects were added and then the files were rendered.

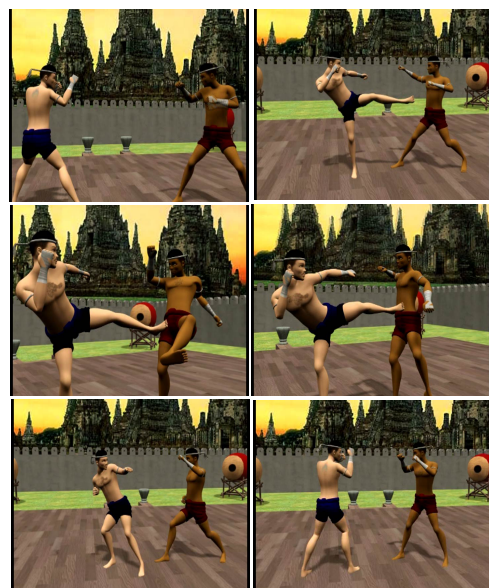


Figure 5. One example of 30 postures of Thai martial arts and self-defense

CONCLUSION AND FUTURE WORK

This paper concerns the procedure in using motion capture technique. Characters and scenes were designed based on Thai characteristics to conserve Thai culture. 3-D characters with low polygon were to be used in the development of the game in the next phase. Motion capture technique and 9 optical motion capture cameras were used to record the data about the right movements performed by 2 experts in the art of self-defense and Thai boxing. All 30 postures of Thai martial arts and self-defense were recorded and the data with incorrect information would be cleaned. After that, there had to be composition and edition along with adding sound. This would become a series of animation for 30 postures with music and sound effects. In this phase, the edutainment was tested with the students who majored in physical education and would respond their feedback in the questionnaire after using. The results revealed that the animation helped the learners gain interest in Thai culture, the right exercise postures, physical activities, self-defense techniques, and entertainment for the learners who majored in physical education at the good level. In the next phase, the edutainment or the game would be revised in terms of frame work and design in order that the results would be compared between animation and game in a case study about frame work and design of Edutainment concerning Thai martial arts and self-defense in the future.

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