

# Digitizing 2D sketched Animated Character for Graphical Imagery Therapy (GIT) Game

Sadaf Sajjad, Sajjad Mohsin, Sahar Riaz, and Abdul Hanan Abdullah

**Abstract**—The paper centers on the digitizing of 2D sketched animated character, to be incorporated in game environment aimed at Graphical Imagery therapy. Two aspects are taken into account: The healing pattern of visual therapy through the use of colors, shapes and form and the use of designing software compatible for gaming software. The character is designed in 3D Studio Max. This software has integrated modeling and animation tools with visual effects and game compatibility. The character is developed through a “sphere” and modifiers are applied to change the shape into a tumor character. Textures are applied and final character is developed by adding bones to make its multiple moves. It is made compatible for game software while exporting it from .max to .fbx extension. The result depicts the designing of proposed 3D enemy character, symbolizing ugly tumor with human features. The final exported extension is easily incorporated in gaming environment.

**Index Terms**—Sketch, 2D, digitization, animated character.

## I. INTRODUCTION

3D modeling refers to a systematic process of developing a three-dimensional object through the use of a tool. That tool can be computer software or a manual technique. Three-dimensional object is modeled when three axes are playing their part at a time i.e. height, width and depth. In this regard, digitizing any 2D sketched object is another aspect that leads to the development of a 3D model. Digitizing is specifically known as a “digital image” that can be seen on the computer screen. 3D model designing is incomplete without a 2D sketch where the idea is presented on a paper in order to digitize it into a 3D form.

3D modeling is now an essential part of a game that is labeled as 3D game. Similarly, 3D animation is an addition to the visual effect of the game that resembles real movements that are seen by human eye. A 3D game is basically a structured playing platform that is usually used for recreation and enjoyment. This playing platform is having its own specific environment that is portraying the theme on which the game is being developed. There are different elements that compliment the game environment e.g. characters, props, game play and medals. These elements altogether create an impact on the player’s mind and interest. 3D game has different genres under its umbrella e.g. war, education, puzzle, mathematics and many more. 3D games

are now being utilized for healing various diseases. The visual content of a 3D game is effectively used for visual therapy in order to cure various diseases.

Graphical imagery therapy is a visual therapy in the form of a 3D game that would facilitate children in fighting against their brain tumors. This therapy has cognitive behavioral effects on children to recover from their psychological illnesses.

The paper focuses on the digitizing of 2D sketched enemy character for Graphical imagery therapy-3D game. This enemy is the brain tumor with which the patient would fight to recover. Two aspects are taken into account in this study: How 3D enemy character is visually presented to compliment Graphical imagery therapy, to heal cancer patients? How to design 3D enemy character and its animations in software that would be compatible with the gaming software i.e. 3D Unity?

## II. LITERATURE REVIEW

Jarvis (2001) believes that 3D modeling is done with the use of basic shapes and forms including sphere, rectangles, polygons and boxes. Pollefeys (2002) adds that 3D model is created after sketching its reference 2D image on the paper. The 2D sketch is known as the projection of a “three-dimensional scene onto a two-dimensional image”. Ono et al (2002) explain that 2D sketching is an easy way to define how the character or any object is to be modeled in 3D form. 3D software is used to create models in multiple frames. Robbins (2003) defines animation as containing separate images in the form of frames that are quickly viewed together creating an illusion of motion. Kirsh (2005) believes that children have been entertained through animated films and movies for more than eighty years. There was found a series of 2D animated characters as international celebrities involving Mickey Mouse, Donald Duck and Pluto. They were meant to entertain children through the portrayal of social issues of the society with comedic elements. He argues that when comedic or aggressive acts are presented in cartoon movies, children develop similar thoughts, feelings and concepts in their minds. Hence, they are influenced by the visual presentation of events, problems and their solutions.

Beside animated cartoon movies, Chuang & Chen (2009) argue that computer generated 3D games are getting popularity. They are ever-growing tools designed by game developers. They have characters in them, too. The use of 3D characters in 3D games is another phenomenon after cartoon movies. Lamb & Johnson (2006) argue that though the use of animation, interaction and multimedia interesting informative projects can be developed. It is quite easy for

Manuscript received May 2, 2012; revised June 3, 2012.

S. Sajjad, S. Mohsin, S. Riaz are with COMSATS Institute of Information Technology, Pakistan (smohsin@comsats.edu.pk).

S. Sajjad and A. H. Abdullah are with University Technology Malaysia, Malaysia.

the students to get caught up in the fun of animated activities. Movement is an effective way to communicate concepts, processes, procedures, and other ideas. The character, animations and 3D games are combined to create any environment. That environment can be used for learning, entertainment or any other purpose. Atkinson (2002) optimized computer-based learning environment that was designed to teach how word problems are solved through the use of an animated educational program. The program utilized instructions and explanations (textually and aurally) to enable the learners to focus attention. Experiment design was the methodology used in the study. It was found that the animated program proved to be helpful in learning process. Besides enabling students to learn through animation and visuals, Pedersen & Villekold (2005) explains that in European school system teacher-training manual are provided to teach them the methodology of using moving pictures. They are guided how to make animations in order to teach students. The most common effect of gaming environment is found on children because they are the one who are fond of playing games. BJORKQVIST & LAGERSPETZ (1985) find the impact of 3D characters on children by a survey. It can be noted that visuals can develop understanding of good or bad behaviors of individuals.

Carvalho et al (2008) argue that computer games as now being used for vision therapy as well. They are used as a tool for the treatment of multiple diseases. They created a game and tested it in small clinic. It has been found that patients have high level motivation towards the treatment. They find that the vision therapy can be used to reduce the frequency headache, eyestrain and the double vision problems while working and reading. Coyle & Matthews (2004) investigate a 3D detective game and find that game can be used to help teenagers overcome their mental-health problems. It is also used to help in mental-health services.

### III. THE METHOD

The study basically involves the modeling of a 3D enemy character that has been sketched in 2D form. That enemy character is the part of a 3D game that is to be developed for "Graphical Imagery Therapy". This therapy is meant to treat tumor patients i-e children. The children are from age 6-16 years. The 2D character has been sketched by the designer after doing a survey from children to know what features they expect to be there in an enemy. Those features are incorporated in to a tumor shape to finalize a Two-dimensional, tumor-shaped enemy character.

The tool for developing a 3D enemy character is 3D software named "3D- Studio Max". 3D-Max is a specialized modeling, animation and rendering software. It has been chosen because the colors, shapes and the form of enemy character can easily be created through this user-friendly software. It has visual effects and motion graphics that can create theme-based characters. The second reason is that it is compatible with the gaming software i-e 3D Unity that has been chosen for game development.

The duration for modeling 3D enemy character is from 27th February, 2012 to 2nd April, 2012. This duration is finalized as per the first-quarter task of the project is concerned.

## IV. RESULTS

Digitizing of 3D enemy character in 3D- Studio Max is a multi-staged process. It has been found that this process is to be followed in order to make it compatible with 3D Unity (gaming software).

### A. Modeling

The modeling starts from a basic shape i-e sphere, specifying its radius and segments. Modifier "Edit Mesh" is applied on to the sphere. Through the use of this modifier, polygons and vertices become visible. Though these two elements, the shape of the sphere is changed as to make it look like a tumor.

After completing the basic shape, it is being converted into the face of the character by adding eyes and lips. Baggy hands and legs are extruded out of the face as to give it human body parts. In this way the Mesh (skin) of the enemy character is completed.

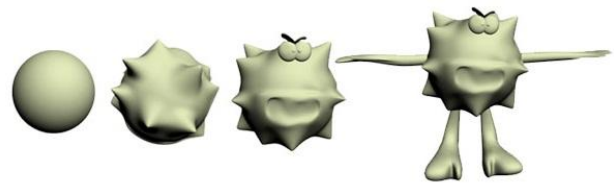


Fig. 1: Modeling

### B. Color Application

Color application is the second step in enemy designing. This portion is kept focused as to make it compatible with the graphical imagery therapy. It should be mapped with such colors that should create desire in the patient to fight against it because it is the enemy to them i-e the brain tumor.

To cater compatibility, green and brown color is chosen to give the enemy an ugly look. The face is given brown color with ugly spots. These spots are green, yellow and pink in color. The hands and feet are given green color because it is associated with bacteria, virus and infection.



Fig. 2: Color application

### C. Bones Adjustment

Bones are adjusted into the mesh of the modeled character. Utilizing the biped (skeleton) available in 3D-Max the bones are applied. After bones application, the modifier "Physique" is used to attach bones with the mesh.

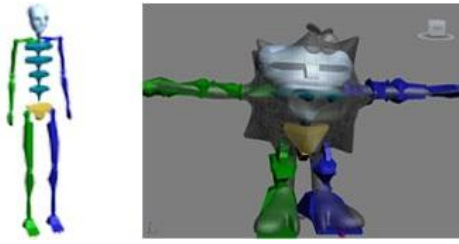


Fig. 3: Bones adjustment

#### D. Animation

To make animations of the enemy character .bip files are applied to it. Bip files are the animated files or motion capture files that are applied on the bones in order to animate the modeled character in a way that bip file is created. The final animations created include: walk, cool walk, run, jog and monster walk.

#### E. Exporting Character in .fbx Format

The final enemy character and its five animations are exported in .fbx format because this format is compatible with 3D Unity (game software in which the game would be developed).

The compatibility process requires certain settings; Units should be set in "Meters", Up-axis should be "Z-axis" as the character is modeled in upward direction, Animations and Deformations should be checked, and the name of pelvis bone should be renamed as "bip1" as root bone, before exporting. The renaming is done because 3D Unity finds root bone to adjust the animations within the game environment.

### V. DISCUSSION

The study comprises of the designing factor in a 3D game environment. Two aspects are covered in the study regarding the visual presentation of a 3D enemy character and the compatibility factor that is essential for using one file format into another.

Answering the first research question as how 3D enemy character is visually presented to compliment Graphical imagery therapy in order to heal cancer patients, it has been found that use of colors, shapes and forms the proposed visual effect is easily achieved. Chang & Lin (2010) compliment this fact that colors are used to communicate messages in order to get a specific reaction from the viewer. In this study, modeling of a 3D enemy character is to be done in a software that must be user-friendly and easy to use. In the study, 3D Studio Max is utilized because it has certain modeling features and mapping techniques with which the visual presentation is professionally achieved. The 3D enemy character has to look like a real enemy with certain features, when seen should give a feeling of hatred. This visual demand is achieved with "mapping" feature of 3D Studio Max. Textures and colors are easily applied in this software. Similarly, adding details on the surface of an object is it's another important feature. The face of the enemy character is given brown base color with multiple ugly spots. These spots are colored with yellow, green and pink whereas hands and feet are given hideous green color. Kaya & Epps (2002) state the green color is associated with disgust and hatred.

The second research question asks about how to design 3D enemy character and its animations in software that would be compatible with the gaming software i-e 3D Unity. The answer to this question is "3D Studio Max". It is argued by Durand et al (2000) that 3D-Studio Max is popular software that is utilized for various purposes by 3D artists. In the study, Modeling and animations created in 3D Studio Max are made compatible for 3D Unity. This compatibility is achieved in to steps: First export .max file into .fbx and secondly import .fbx file in 3D Unity to use the model and animations in game environment. This process is utilized for incorporating 3D models in 3D Unity. This question is raised because the game for Graphical Imagery therapy is to be designed in 3D Unity (the gaming interface). So, it was the need of the hour to design 3D enemy character in a format that must be incorporated in 3D Unity.

### VI. CONCLUSION

The study concludes that while 3D designing or digitizing 2D sketched character, the basic principles and elements of design play their part. Basic shapes, colors and textures are combined to produce the proposed visual effect. 3D designing requires designing software that should be user-friendly to help the designer or a modeler to visually present the idea.

If the designing is meant to be utilized in other software for developing any product (game, interactive environment, learning procedure), then software compatibility is kept focused. This is good for smooth designing progression in order to avoid problems that may counter in further developmental procedure.

### ACKNOWLEDGEMENTS

The authors acknowledge ICT R&D Funds, Ministry of IT, Government of Pakistan for generously funding the project "3D Graphical Imagery Therapy for Healing Brain Tumor in Children". This paper is among the series of researches being done under this project.

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