

3D Animation in the Film Industry

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Summary – This paper processes the use of 3D animation in film through analysis and practice. It presents the possibility of modeling and animating a film, inspired by the role playing game "Dungeons and Dragons". Blender, which has potential use in education, was used as animation software.

I. HISTORY

The idea of presenting movement through a medium appeared first in the Paleolithic, but became popular only in the 17th century AD, with various games of shadows and with the use of the “magic lantern”. Using the sun, candles and lanterns as light sources, images from transparent slides would be projected onto walls or ceilings. Through the centuries and many phases, the lantern developed into an overhead projector, and later into a projector as it is known today. In 1833, the first stroboscope appeared. Thanks to the stroboscope, cinematography was born and finally between 1895 and 1920 animation as we know it today was developed. Around the turn of the millennia, computer animation was born and took over as the new dominant technique. It is most often associated with three-dimensional films, although many works are generated by this form of production. For example, the first film made entirely by computer and without the use of cameras: “Rescuers in Australia” (1990), does not look much different from the traditional style of hand-drawn and later photographed images.

The Japanese style of animation known as “Japanimation” or the much more popular term “anime”, although it originated around the 1900s, took off and began to gather a huge audience in the USA with series and films such as “Astro Boy”, “Speed Racer” and “Akira”. Beginning in classical animation, the Japanese technique migrates over time towards a mix of traditional and digital style through shading, CGI and the like. As the American culturally-targeted audience of animated films shifted from adults to children, some Japanese publishers took the opportunity to sell more serious films, drawing on philosophy, existential issues and complex life dilemmas to steal the teen and adult audience who lost their cultural “right” to watch cartoons. This idea proved to be extremely

profitable and resulted in anime and goods related to it, to be one of the main exports of Japan today.

II. FILM ANIMATION

The manifestation of animation in film differs drastically depending on the use. There are films with a large use of computer-generated imagery (CGI), films with miniature use where the sole purpose of animation is to capture some details or atmosphere and of course there are fully animated films.

The use of CGI in movies is an extremely common thing today, although it all started almost roughly. In the first instances of use, the effects, however interesting they were to see, were too conspicuous, extremely protruding and proved to kill the immersion of the story instead of further deepening it. Fortunately, CGI artists as well as software have progressed and thanks to that, it is now sometimes difficult to discern reality and special effects. “The real attraction of the animated film, as opposed to more prevalent live-action variety, is the fact that there is literary no limit to the bounds of the writer's imagination, whether the film is to be produced in 2D or 3D.” [1]

The use of CGI animation in films is comparable to the use of music, camera angles and lighting, although it is not directly related to the story, it serves to better explain it and bring the audience a better experience.

Animated films are divided into two groups: two-dimensional and three-dimensional. Two-dimensional animated films, in fact, involve a number of films made with three-dimensional techniques because they ultimately give two-dimensional results. Although there is currently a misconception that animated films can only target a young audience, the directors try to process more complex topics through simple dialogues, humor and entertaining characters with the intention to draw an audience of a wider age spectrum.

III. REVIEW OF THE MOST RELEVANT SOFTWARE

As the modern market for digital mass production and public accessibility arrived, people began to animate and create films from their homes, both the simplest two-dimensional and complex three-dimensional animations that almost match large animation houses and studios. With the advent of these independent artists, companies saw a path to making money, but also to finding new names and talents in the field of animation, and that path was affordable software for new creators. The struggle between this software is never ending, since the technology is constantly evolving and enabling new directions of program progress and new ways of making the creation process simpler. There are many programs in the race at the moment, but three stand out: Maya, 3DS Max Design and Blender. [2]

Maya is Autodesk's subscription software for 3D animation, modeling, simulation and rendering [4]. The annual subscription to the Maya 2020 software is \$1620, but it also comes with the direct help of specialist support and access to a large collection of online resources. Maya has an affordable design that allows for fast effective modeling and animation, but also a complex interface that in most cases requires the help of experienced designers to master. Even though hard to master, once that that happens, it provides one of the best platforms for 3D design. Taking into consideration the simplicity of the program but also the complexity of the animations it can create, Maya is considered to be at the top of the 3D modeling game. It is also widely used in large studios thanks to its scripting language "Mel" which has an incredible level of flexibility, and companies like to install their special tools in order to make their job much easier. It also has an excellent set of its own tools for positioning skeleton structures and models (rigging) and fantastic but affordable animation methods that facilitate the workflow of animators. Some of the companies that use Maya are: Blue Sky Studios, Framestore, Moving Picture Company and many others. Maya is available on Windows and Mac.

3DS Max Design is also an Autodesk subscription-based software, and it's priced \$1,620 annually in 2020, same as Maya, but is used for more extensive three-dimensional designs, modeling, animation, and rendering. The interface is simpler than Maya's and thus the software itself is a more accessible work environment, therefore used by beginners, but also by a number of professionals such as: architects, designers, engineers and visual experts. Unlike Maya, it gives visible results after only a few steps. 3DS Max truly outshines others during the creation of complex models, by providing

a very fast workflow with all polygon processing tools in just one part of the user interface. It also has a fantastic ability to visualize architectural works that Maya does not. 3DS is also available on Windows and Mac.

Blender is a free software created by the eponymous "Blender Company". It offers sculpting options but also classic 3D design and thus is a great place to start studying digital versions of these techniques, designers who do not have enough experience or ability to start with Maya, can find that starting point in Blender. It is mostly based on the field of animation and visual effects, mainly for the purpose of creating entertaining content. [3]

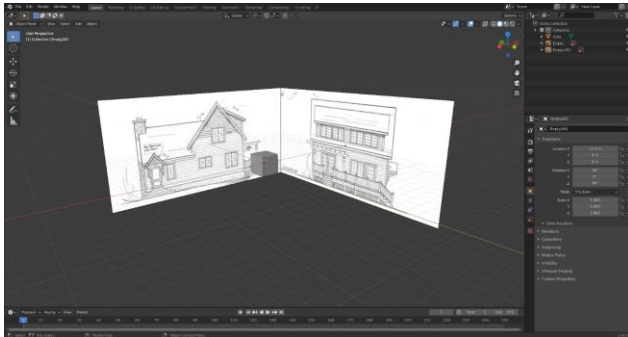
IV. ANIMATION STORY ORIGIN

The original idea for the animation script actually comes from a popular role playing game called "Dungeons and Dragons". It works by having a number players, and a Dungeon Master (DM), who is in charge of creating the whole world through which their players will go to solve quests and experience adventures. In one of these games, the character "Hunter Stone" was created. He is a former Confederate soldier in the 1800's and is living with his family on a farm in the prairie. After an attack of a native tribe on his home, he becomes a general of the American army with a grudge and tries at all costs to prevent the players from bringing peace to the Wild West, just to be able to continue raining vengeance on the natives for the suffering they brought him decades earlier, thus being the main antagonist of the campaign. The plot of the animation begins with Hunter and his son planning on painting the barn door, while his wife is going towards them to bring them a drink. Hunter explains how to do the job properly when they are interrupted by a sudden attack. A chaotic fight ensues in which Hunter loses his wife and child. The injured man crawls out of the barn and sees his wife's hairpin on the ground, in an attempt to grab it he accidentally pricks himself, and suddenly Hunter is filled by some new strength. He attempts to stand up, but is immediately hit by a spear and thrown back to the ground. When he looks up, he sees something he did not expect, himself standing exactly where he stood before he was knocked down. Still not understanding his newly developed power, the original Hunter looks at his arms in awe, unsure of what just happened. For context: Hunter received a "Talent"; an ability that can be anything ranging from a most ordinary hourglass, to the creation of matter from thin air. Hunter's talent allows him to create copies of something, and even himself, after adding inertia to it. When he is hit in the scene, as inertia is created, a copy falls to the ground, while

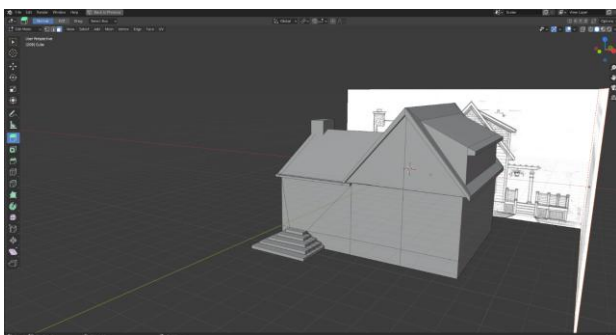
the original continues to stand. A fight ensues in which he defeats the remaining opponents. In the end, tired, broken and without hope, he falls to his knees next to his former home and thinks about what to do now.

V. CREATION OF THE ANIMATION

Model 1: Farm

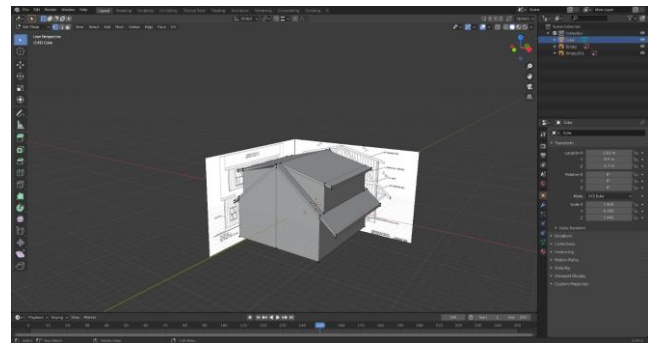


First, a template is placed in the background so as not to work blindly. Starting from one cube, it is slowly built towards the desired shape using the selection tool and the wireframe option, the edges of the object are placed in the desired positions. In the case of windows, chimneys, stairs, etc., extrude is used in combination with inset and loop cut tools. When using a loop cut, parallel lines are created that are moved by selection to the desired location, the same is done with the inset tool. Wireframe mode allows one to see the template through the model and makes it much simpler to format it according to the design. It is possible to shape the box by simple selection. Using a loop cut, a center line can be set and then extruded upright to create a roof shape. Details are created using the commands on the numeric keypad 1, 3 and 7 that place the user on the x, y and z axes. The chimney is extruded from the bottom of the farm. The preparation for windows, stairs and doors is done via the inset and loop cut options, while in the end, the terrace, doors and windows are created.



The excess lines created by loop cuts and insets are removed with the dissolve edges option.

Model 2: Barn

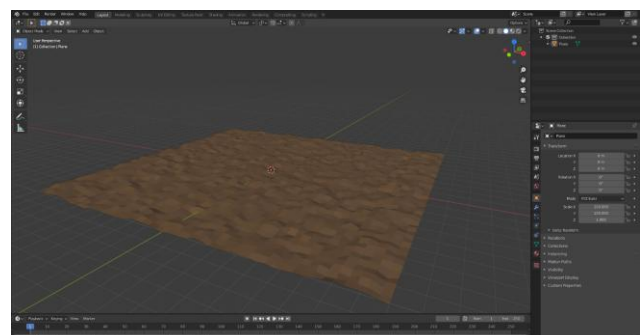


The same technique is applied on the barn as was on the farm and therefore a similar result is obtained. Details are added as well as windows and doors. With the dissolve edges option, the excess lines, created by constant loop cuts and insets, are removed. The process of creating a barn is extremely similar to the process of creating a farm.

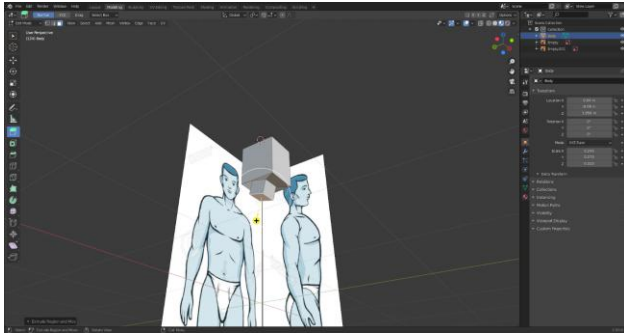


Model 3: ground

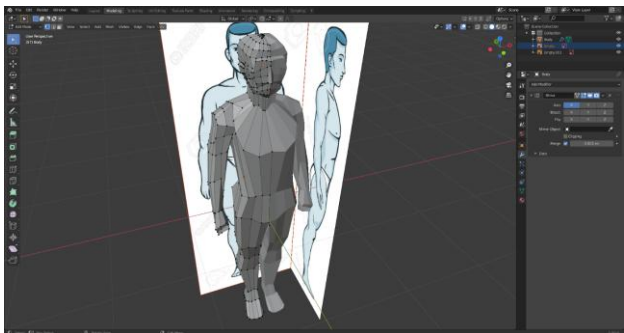
For the ground first an empty flat surface (plane) is created and scaled to the desired size. Using the subdivide option set at some large number such as 50, the plane is divided into a 50x50 matrix. The fractal value is now increased to obtain random irregularities on the terrain. The material is adjusted to the color of the earth, with some settings to avoid glare and irregular light shafts. Thus simple earth like ground is made. After this, a very simple grass is created and inserted onto the ground through the hair function.



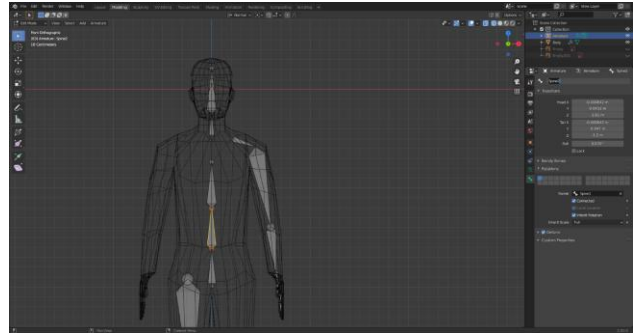
Model 4: human and skeleton



In the beginning there is a simple model and a head frame is made. Using the inset method, a cut is created that corresponds to the neck. Then the neck is pulled out with an extrude. Then through the use extrude the rest of the body is made, by selecting the right side, and using "Delete Faces" option half of the body is removed. The remaining left side is now selected and the mirror option is applied to minimize the amount of work by working symmetrically on both halves. After the slab is made, as a Renaissance artist, chipping away with the chisel piece by piece, the creator follows the pattern, shifting and morphing, until everything fits properly. In the end, something close to a human being emerges.



The skeleton is added through the "Add" option and then through selection of the "Armature". It starts at the bottom of the spine and forms a pillar to the start of the neck. At the base of the neck, it branches out to the right creating a shoulder and an arm, and upwards – creating a neck and a head. After everything is done, the bones are named. Using the "auto name left / right" option lets the program know which half of the body is left and which is right. Now that the program knows which half of the body is which, it can automatically generate the other half through the symmetry option.



Scene setting:

The farm, the ground as well as the actors can now be added and upgraded with additional details, textures, objects and so on since there is a set scene and it is possible to observe how it behaves in the given conditions. Now the animation process can begin. First a camera is inserted and after that the "animation" mode is activated. In animation mode (left), one may click on the numeric keypad 0 to bring themselves to the camera named with that ordinal number. The camera is animated just like objects through keyframes. To add a new keyframe, one sets the timer (below) to the desired frame and clicks the letter I. If the object is in different places between two different keyframes, Blender will generate an animation that represents the movement between the two locations.



VI. CONCLUSION

Blender is a fantastic software for creative expression but also for professionally oriented work. Since it is free, this kind of software should not be missed by any animation startup. As a key factor in many major animation houses, video game companies and even being used as an element in the confusing music videos of experimental hip hop bands, Blender has come a long way. Since its beginnings in 2002, it has truly expanded and found a home in the most unexpected places.

Although not easy to master, it is not difficult for someone who has little experience with animation to understand it and pass that knowledge on. This software can be ideal for classrooms as a medium for learning about a new, interesting art form. Such

an interaction would reveal many new names in the world of animation, but also in the world of film in general, given that amateur directors would get a chance to try and test their mettle in a safe environment.

REFERENCES

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- [2] <https://www.educba.com/maya-vs-3ds-max-vs-blender/>
- [3] <https://www.blender.org/about/>
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- [5] <https://www.bgsu.edu/content/dam/BGSU/libraries/documents/collab-lab/Maya-Tutorial.pdf>