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METAMORPHOSIS OF ANIMATION: COMPUTER AIDED OVER TRADITIONAL MODES OF ANIMATION

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Abstract:

Animation as a technology is generic and as a discipline it has been growing leaps and bounds. Application of animation tools extends even to industry, education, trade and entertainment. In depth understanding of the concept needs a chronological development studies including the history and technological innovations. An attempt to trace the metamorphosis of animation from the stone- age till date so as to get a comprehensive knowledge and thereby analyze the difference between traditional and modern animation techniques is part of the research work, which is underway. Essentially this is an effort to pose a research question as to weigh the relative importance of traditional vis a vis computer-aided animation techniques. The process of finding an answer is central to this paper besides looking at the contours of animation and its application to various fields

Key Words: Animation, Modern, Metamorphosis & Traditional

Introduction:

Animation by definition is the quality of briskness, liveliness or excited state, besides, in this context it is concerned with methods of making inanimate objects to move so as to create an illusion of life. Animation can be created by drawings, photographs, objects like puppets and computers wherein a series of pictures created which are slightly different from the previous one and when viewed quickly in a sequential manner create an illusion of movement. An animator is the person who creates the object and makes it appear to move, a little like the Creator, but it is only an illusion and not reality. Even so, the imagination, ethos, uniqueness, creativity and the message of the animator could be fully expounded in the animation created by him, thus opening up a broad limitless canvas for creativity. Basically images are created with slight difference from the previous one and when viewed continuously looks as if there is movement, in short it is only the serial visualization of the images that leads to animation and not just the creation of images.

Presently animation has found its presence into all walks of life like education, entertainment, commerce, sports, architecture, and health care and so on. It has entered into our daily life through advertisements, video games and smart phones that we do not realize its presence or give due consideration for it. Major sectors that flourish using animation are cinema industry, advertisements and e-learning. All animators strive to create more realistic and legible pictures to make the audience get engrossed in their creation. Originally animation was designated for small children, later video games pulled in youngsters and currently people of all ages find animation very useful to conduct their everyday activity. Achieving an in-depth understanding of animation, a look into its history and evolution would be necessary. Broadly we could categorize evolution of animation as two periods, viz. animation before computers and animation after computers. Though the basic principle and methodology remained same in both times, the advent of computers has revolutionized animation and taken it to greater heights. The purpose of this paper is to trace the origin of animation from traditional to

the modern era by taking stock of myriad stages of its development. From the available literature like, Encyclopedia of Multimedia and Animation, The Illusion of Life, Reframing Photography, Animation for Beginners, the present paper lists out chronologically the metamorphosis of animation and discerns the pros and cons between traditional and modern animation.

Traditional Animation:

Human quest to create motion dates back to Stone Age, wherein a look at the cave paints clearly expounds the art of showing mobility thereby bringing life to the creatures depicted in those paintings. Stone Age man had been so engrossed to create movement that his cave paintings show some creativity in making the viewer visualize movement. Some paintings with series of same animal in different postures (Figure 1), some animals with extra legs in superimposed positions (Figure 2) revealed rudimentary stages of animation.

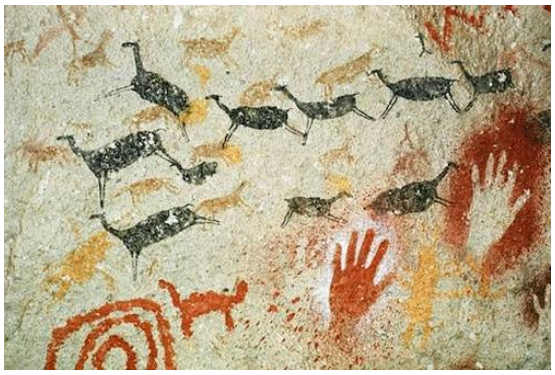

Figure 1: Stone Age Painting (Wikipedia)

Figure 2: Cave Painting (Wikipedia)

A 5000 year old Iranian bowl (Figure3) with five images of goat trying to jump exemplifies an attempt to express movement by people of that time. An Egyptian mural dating back 4000 years has wrestlers painted in various postures in a serial manner to bring out the actions through the drawing (Figure4). The great Leonardo da Vinci, whose works (Figure 5) still remain proof of his ingenuity, has had a shot in creating movement in his anatomical drawings- changes in the muscles and bones of upper arm as a person turns from profile to frontal position (Encyclopedia of Animation).

Figure 3: Iranian Bowl (Wikipedia)

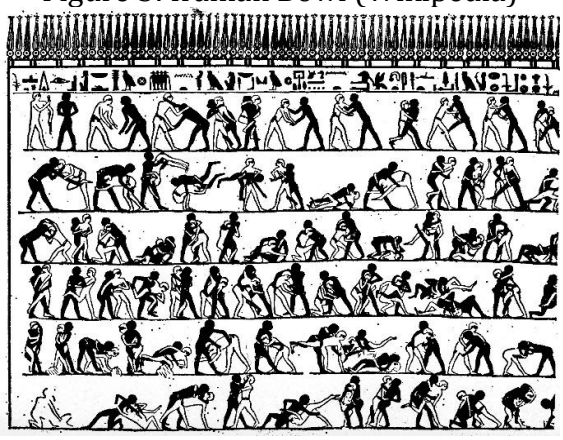

Figure 5: Egyptian Mural Wrestlers (Wikipedia)

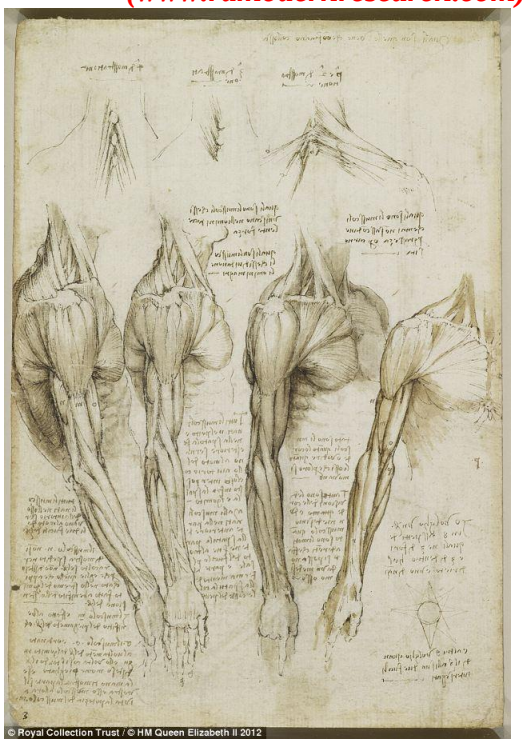

Figure 5: Leonardo Da vinci – Human Anatomy (Wikipedia)

Concomitantly the creation of zoetrope, the first toy showing animation could be construed as the first instrument which created real movement as the previous examples are stationary and it was left to the imagination of the viewer to realize movement. Zoetrope was an animated vintage toy created in 180 AD, had a cylindrical cup with multiple slits (Figure 6), serial drawings, on the inner surface, of human or animals in various postures. When a person views through the slits and the zoetrope rotated we can see the animal run, the birds fly or the man walk. By 1650, advent of magic lantern (Figure 7) marked a change in animation creation as this lantern projected pictures on the wall and the films with serial drawings moved to create a video like effect.

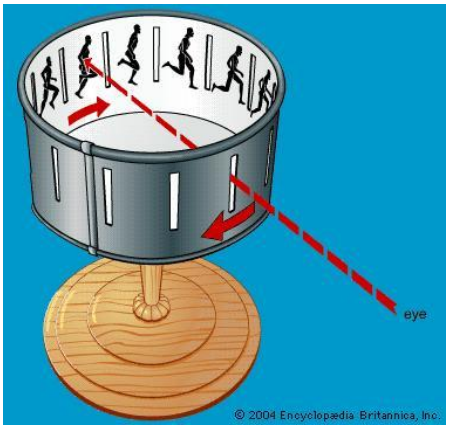

Figure 6: Zoetrope (Wikipedia)

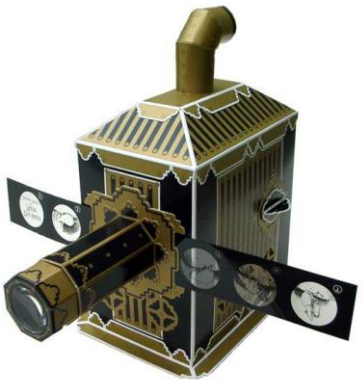

Figure 7: Magic Lantern (Wikipedia)

Thaumatrope, (Figure 8) a toy created in 1824, had a disc with pictures on both sides, when rotated with a string it created an illusion of movement merging both images- like the parrot captured into the cage. Phenakistoscope, (Figure 9) 1831, an early Greek animation device which consists of a wheel spinning on a rod vertically on top of the wheel images in sequential postures are painted with slits separating each image. When the wheel is rotated and the image seen through the slits in the mirror

placed in front, we can see movement. As a variant two discs, one with pictures and one with slits placed one on another, the disc with pictures rotated and viewed through the slits of the stationary wheel and we could see movement, here no mirror is required for viewing and we see animation like dancing, jumping and wrestling.

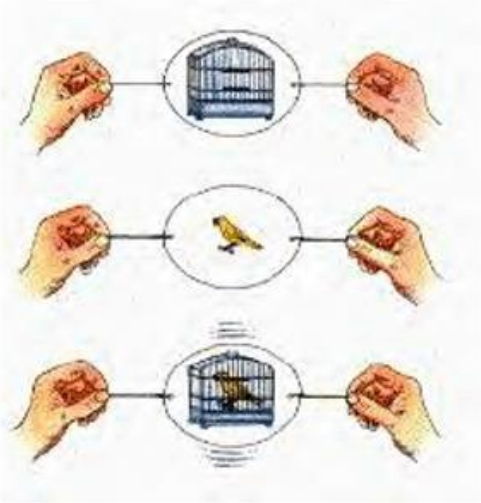

Figure 8: Thaumatrope (Wikipedia)

Figure 9: Phenakistoscope (Wikipedia)

Praxinoscope, (Figure 10) 1877, is the successor of zoetrope developed by Charles Emile Reynaud, A French, reflects animation better than zoetrope. The cylinder with series of images remains the same but the centre of the cylinder consists of a stationary smaller cylinder with mirrors. When the praxinoscope is rotated the animated images can be viewed clearly in the mirrors and no need of slits here. Flip books are another major development in this context as they are still used in schools to teach children about creation of movement (Figure 11). A book with images on each page with a slight difference drawn meticulously and when the book is flipped it appears as if there is movement like appearance or disappearance or change in position of the characters depicted in the book (Solomon Charles, 1989).

Figure 10: Praxinoscope (Wikipedia)

Figure 11: Flip Book (Wikipedia)

Puppets, one major form of animation has a very old history linked to the tradition and culture of many countries. Local tales, epics, moral stories, public awareness messages constitute the story depicted by puppetry. Even the materials used for creation of puppets vary across different countries that clay dolls, cloth dolls, leather, plastic, metal and other locally available materials go into the formation of the puppets (Figure 12). The basic principle to create movement is the same, moving legs, arms and head through the strings tied at the specific points in the puppet brings an image of life and action.

Figure 12: Puppets (Wikipedia)

Discovery of movie cameras opened up a multitude of creativity in animation sector that many variants like stop motion animation, clay animation, cel animation and 2d animation evolved and these could be taken forth for a larger viewing as can be projected world over. George Meiles, accidentally discovered the technique of stop motion animation when he was shooting a film. He was capturing a moving bus and he had some problem with his camera and stopped the recording. Again when he resumed it the bus had passed and another vehicle came into the frame. When this recording was screened it appeared as if the bus transformed into another vehicle before our eyes. By 1899 this technique was in vogue and many advertisements and films were produced incorporating stop motion animation (Stephen Cavalier, 2011).

Painted clay toys (Figure13) were utilized to create films like Gumby Show (US, 1957-67), Morph Shorts (UK, 1977-2000) etc. These clay toys had wire frame inside and their parts could be moved as desired. Each scene is set and recorded by the camera and the next would be a slight variant of the previous scene. When screened in sequence (10-12 frames per second) it looked as if the clay toys moved and spoke on their own. The basic principle is stop motion but the material used was different like cut outs, inanimate objects, puppets, real human beings and so on. Graphics involve flat visual aids that are manipulated to show movement like pencil writing the letters, moving letters, jumping letters, size increase and decrease, fade in and out (Richard Williams).

Figure 13: Claymation (Wikipedia)

Earl Hudd and John Bray in 1915 created the concept of Cel animation and it formed an important technique before the advent of computers. The main principle is to draw the images on a transparent sheet called cel (Figure 14). Immovable objects need be drawn on only one cel but moving objects were drawn on different cels with different postures. While creating one scene the cels are placed one over another to create the scene to be recorded. For the next scene the same immovable object cels can be used and for the moveable objects a different cel with different posture introduced and then recorded. This process negated the need to draw all objects in a scene repeatedly in each frame. Extra bright colouring is given to the lowermost cel picture as it might look a little dull when viewed through multiple cels placed above it. Further modification

lead to limited animation wherein, only the moving parts were drawn separately and placed at the particular place while recording each frame. Instead of the whole person, his hands and mouth were drawn in different cels and placed over the stationary picture and recorded. This greatly reduced the work of the animator as he could limit his drawings to moving parts only (Kit Laybourne, 1998).

Figure 14: Cel animation (Wikipedia)

In 2D animation, the famous Walt Disney films like Tom and Jerry, were created by serial drawing and recording the frames and finally projecting the film with 10-20 frames per second bringing out movement as desired. Though laborious, each frame was drawn meticulously with same features and with a slight difference (Figure 15) and then recorded, many films using this technique was produced to entertain the audience and that period (1920-1950) was called the Golden Era of Animation. Animated characters like "Mickey mouse", "Donald duck", "Tom and Jerry", "Silly Symphonies", "Snow White and Seven Dwarfs" still remain an household name due to the lasting impression created by Disney Cartoons. Cel animation techniques, xerography, animation loops, multiplane camera, rotoscoping, APT process, cel overlay, computers and limited animation are other techniques introduced to make the cartoon work more realistic, less time consuming and lesser burden of work (Rebekah Modrak).

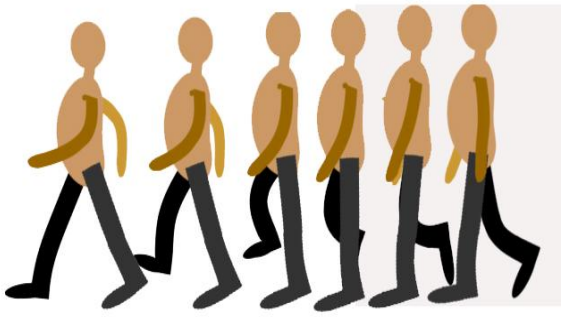

Figure 15: 2D Animation Drawing (Wikipedia)

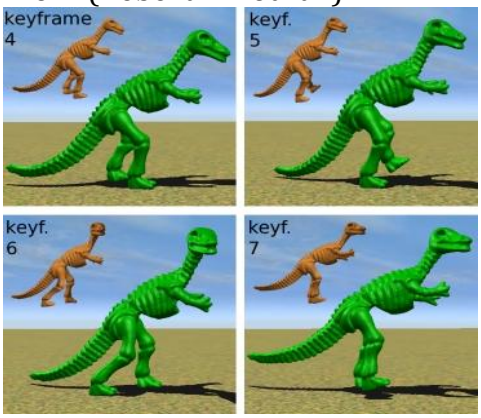

Figure 16: Object Animation (Wikipedia)

Modern Computer Animation:

Computer animation started from 1990s leading to a rapid progress in animation techniques, process and screening. Drawing characters and background pictures could be carried out in the computers and animation through computer programming. Multi-various software developed made it easy to create, replicate, texturize, color and light the pictures. Both 2D and 3D animation could be created just by using computers, though the principles remain the same. The task of creating an image is the same but

carried out on the computer instead of paper and provision of light, color and texture are done by using appropriate computer software.

Computer Graphics is digitally synthesizing and manipulating visual content (Wikipedia). Whirlwind and Sage projects in 1954 were the beginning of computer graphics though the nomenclature was given by William Fetter, a graphic designer for Boeing, in 1960. Graphics, though not exactly animation, has a role in creation of the images we plan to animate. It represents any graphical model created in the computer and further improvised to suit our needs. Anything other than text and sound in the computer could be attributed to computer graphics. Objects rendering, shading, coloring, ray tracing, radiosity, light quality are some techniques facilitating images more realistic and appealing. Appropriate software makes creation of images to suit our need and manipulation of size, texture, light, color, shadows etc. by just filling as per requirements in the correct space for the computer to execute (James D. Foley, 2013).

Two Dimensional Animation:

Two dimensional animation comprises creation of images, pictures, characters in a flat background. 2D animation is the same as traditional animation where pictures are drawn serially with slight variation and run with 24 frames per second to create movement. Computers aid in creation of pictures, coloring, lighting, editing, moving through the software developed for each action leading to time saving and more realistic images. Story boarding, character modelling, background modelling, animatic, light, colors, texture, editing and rendering all done with the help of computers, thereby saving labor and time to some extent. Analog computer animation, flash animation and power point animation are a few examples of 2d animation (Morr Meroz).

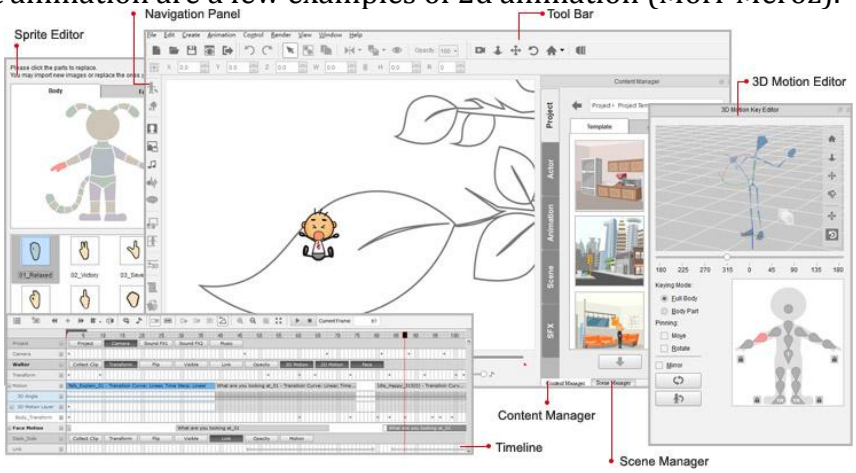

Figure 17: 2D Animation(Mor Meroz)

Three Dimensional Animation:

Images, characters and background models recreated in a three dimensional sector with the help of computers could be compared to traditional puppetry, Claymation, stop motion and pixilation techniques. Advent of 3D animation with computers has opened up various avenues to utilize animation techniques in all walks of life. A 3D model is a digitally created model with the basic mesh, skeletal structures and joints, which help in manipulation of the image as desired by the animator through computer programs (David Rodriquez,2013) The skin, texture, colour, light, hair, gravity, expressions could be recreated over the mesh of the designed character and ordered to move as programmed. The first movie to use CGI completely was Toy Story produced by Pixar in the year 1995 and released by Walt Disney Pictures. 3D Max and Maya are the two major software that help in creation of 3D pictures. More than

entertainment, 3D animation has created a revolution in education, advertisements, engineering, architecture, commerce, games, travel and recreation. Recent innovations in animation are directed in creation of more realistic character with hair, skin, eyes, expressions and movements indistinguishable from human. New software and techniques are being developed all over the world that in near future the digital characters could not be differentiated from real characters (Niit, 2003).

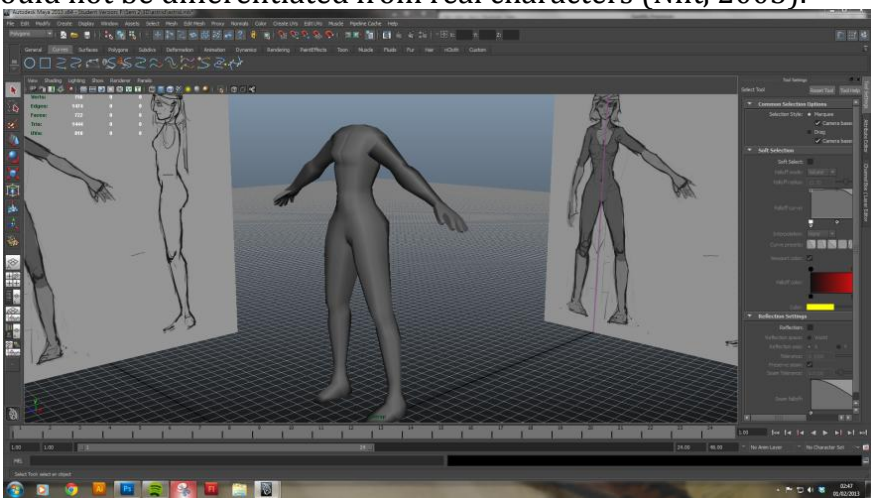

Figure 18: 3D Animation (David Rodriquez, 2013)

Discussion:

The above exercise of studying the metamorphosis of animation in a chronological way has made this technique explicit in a way that the basic idea is the same- simulation of motion, but the modalities are numerous. Stone-age man with his limited resources had depicted movement through his cave paintings, while the generation after represented motion by painting same pictures with little difference. Next came creation of toy like gadgets which actually showed movement like zoetrope, praxinoscope, thaumatrope, phenakistoscope, magic lantern, flip book etc. Invention of cameras further took animation to a higher level that any object could be animated and shown as if they are alive. Be it a picture, clay doll, plastic doll, puppet, real life objects could be pictured in a series of different postures and when replayed continuously created an illusion of movement. Till date this basic method stands the same though it has been fine-tuned through computers to create a smooth movement. Animated cartoon films, mainly by Walt Disney, threw open the doors for creativity and imagination leading to development of animated films and ads at a faster pace and gathered momentum after the advent of computers.

Further, creation of an animated film is a tedious and time consuming task taking a few years for completion of one full length film, where thousands of artists work in tandem hours together to manually draw each frame exactly same as the previous one but with slight variation. Animators tried various techniques to reduce their workload by inventing xerography, cel animation, rotoscoping, animation loops, limited animation and so on but introduction of computers had drastically enhanced the process by reducing the time and effort put in by the character modeler and animator in many ways. A character modelled in a computer could be reproduced into any number of copies just by the click of a button, some minor changes could be carried out in each frame with appropriate tool. Creation of story board, animatics, character modeling, background models, special effects, rendering could be done with the software developed for each action and thus save time and energy. Computer aided graphics has permitted human imagination and creativity to develop leaps and bounds that there is

no limit and nothing is impossible in this context. Exotic characters, out of the world human forms, characters with special attributes, capacity to execute an action which was not humanly possible, making animals to play act and even non-living things to speak and move are few examples to emphasize dominance of computers. Advancements at a rapid pace has led to characters which look so real that one day it would be difficult to distinguish between real picture and animated one. Motion capture technology, the recent introduction into the animation world depends solely on computers to create movements on screen that are mimicking real live characters and this is gaining importance more and more in the current scenario. The process of advancements, improvising and new techniques are bound to continue in years to come leading to high level animation where the basic – illusion of movement – remains the same notwithstanding.

Conclusion:

Life has ever been a wonder to human mind as none could pinpoint where life is or what sustains life. The seat of life is not heart as it is only a pump governed by brain, it is not brain as even after brain death a person lives, and it is not lungs because people can survive for some time without lungs. Such marvel of life has been tantalizing humanity since Stone Age that from that period man has been trying to create life by making things move. Generally movement denotes life as inertness denotes death, consequently in the quest to locate life, man has been trying to create movement as a prerequisite to understand life. From Stone Age till now human beings have tried to recreate life by making inanimate things appear moving and that has led to development of animation (Frank Thomas, Ollie Johnson). All these animation techniques produce only illusion of movement and not real movement or life. The science of robotics has made some advancement in making robots move but they only act on command and has no mind of its own. Contrarily, in animation pictures the creator or animator lets run his imagination in creation of exotic characters with super human capacities and let them act in impossible ways far beyond the reach of mankind. Even normal characters designed has a special impact of the creator that they remain in this world as that character though only digitally. Mickey mouse, Donald duck, Scooby, Nemo, Tom, Jerry all are digital characters but exist in the mind of audience as individuals with special features. In a way it is creation of more characters with incomprehensible abilities, abilities which we may wish to possess in a virtual world. They are immortalized as they remain the same till the end of the world even when its creator is no more. Alternately real human actors too play multiple roles in movies but their real identity remains the same and the character they play is only acting. Unlike animated characters which remain the same throughout life, real actors play different roles and it constitutes only acting and not creation of new life. In short, animation technology has created many new characters in the virtual world and has been a hallmark of the imagination and creativity of human mind. The penchant for creation of animation could be the quest to find the seat of life or what constitutes life. Future developments could take man nearer to the answer as more and more inputs are introduced to create a more realistic live character.

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