**Technology in Animation**

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Animation has been around for a long period of time. Starting in the prehistoric human age, the use of fire to flicker and illuminate different images to make the viewer perceive movement, as explained by CNET. The different drawings would appear and disappear as the flames would move, creating this ‘animated’ effect with the paintings. While there would always be examples of people making sequences that could be lined up and compared to an animation, it would not be until the 1800s that things would take off regarding animation in film.

In 1888, the Optical Theater was patented by Emile Reynaud. According to Emile Reynaud.fr, “the characters are projected by a first *magic lantern* which reflects them onto the mirrors of the faceted cylinder then through several lenses, onto a mobile mirror which allows them to be repositioned on the screen.” This process dazzled French viewers and was one of the earliest projections of animation seen. The process also originated before the takeoff of film since Reynaud only used gels instead of film to highlight his films. This would be a similar process to the celluloid process, only using a different medium to achieve a similar effect.

While animation had continued from the Optical Theater, it was not until major studios started picking up the craft that major developments began. One major artist in the 1900s was Windsor McCay. McCay created notable films like Little Nemo, but his most notable was Gertie the Dinosaur. The film featured Gertie, a gigantic dinosaur, who did as McCay commanded. This integrated film and live acting all in one performance. The technique would not be used often, due to the difficulties of pulling off, until later technology would allow for ease in acting alongside the animation. Often this technique would be used in live theater productions, though some techniques in acting would also be carried over to when actors need to act a stand-ins for CGI productions.

The next major change in animation technology would come in Rotoscoping. In rotoscoping, the artist animates over a projection of a film still. This lets the artist copy movements and minor details that you would not normally draw while animating, thus making the product more realistic, and the process quicker. Max Fleischer was the one to patent this technique in 1915, as seen in his patent. This process can be seen in works such as Loving Vincent, Disney’s Cinderella, and even live-action films such as Guardians of the Galaxy and Who Framed Rodger Rabbit.

Sound was a substantial change in the animation scene. Before adding sound, live music would be played to accompany films, including animated films. When sound was added to film, in 1919, animation studios knew they had to adapt. The first animated films with sound were from Dave and Max Fleischer’s Inkwell Studios. These were 19 films groundbreaking with sound. Audiences would find the use of sound to be much more immersive than just having a live band since animation was synchronized up with the sound and animated with the actual intention to go along with it.

Sound was not the only exciting aspect to come to the animation world in the 1900s, color made animation have a whole new aspect to it, as the artistry could be expanded as the craft added color to its repertoire. Color could show more detail than was available in black and white. In 1937, Snow White was shown, being the first traditionally animated feature. This was a major achievement in itself, but its being in color made it all the grander to viewers. According to Technicolor studios, Snow White was shown in Technicolor, making it not just the first feature animated film, but the first to be in color as well. Color would soon become a staple in the film industry, but still was a while away from reaching TV sets.

Animating planes would become another great achievement for the animation industry in the year 1933. This is because of the creation of the multiplane camera to create an illusion of depth. This process included several different clear plates hung under a camera. All these layers could be moved on a track to move more realistically. The first use of this, according to Charlotte Reiniger, was Die Abenteuer des Prinzen Achmed. Many different 2D animated films would use this technique if they did not want to have a flat look with their animation and landscapes. Landscapes would be able to move differently throughout the planes to create a background that moved much more realistically.

Mocap, or Motion capture, was invented in 1959 by animator Lee Harrison III. He invented a body suit at the time that would track movement. “...lined with adjustable resistors called potentiometers, which enabled him to record and animate the movements of actors...” Adobe para 12). This suit would be crucial to creating mocap animation and tracking the movements of actors for movies, video games, and other projects that involve animation. Famous media that use mocap are the Just Dance game series and the Polar Express film. The medium would also be best used when animators change expressions or actions instead of only relying on them to create more realistic animations. When misused, people often cite animations as ‘uncanny’ with this method.

It would be a while before the next big innovation in animation technology. Computers would take animation by storm. Computer animation would change a lot. The first computer-generated animation was created in 1960. This showed a car traveling down a parkway for about 50 seconds, as explained by the tekniskamuseet website. In the 70s, the first piece of digital animation was created for Michael Crichton’s “West World”. “Westworld was the first feature film to use digital image processing. John Whitney, Jr. and Gary Demos at Information International, Inc. digitally processed motion picture photography to appear pixelized in order to portray the Gunslinger android's point of view,” explained by historyofinformation.com. This pushed the realm of computer animation off into the feature film world. Another big leap in terms of 3D animation was the creation of fractals. They are used to making a much more real-looking 3D model by making smaller deviations in the model to give it more realistic nuances. By the end of the 1970s, 3D software finally came to home computers for more people to use, as seen in the BrutalDeluxe.fr. This would allow more people to be able to join in 3D modeling, leading to a boom in more studios with access and access to the public with the 3D modeling experience. Thus, the idea of being a 3D modeler and animator would slowly start to spread to a wider audience of people.

Then what we typically call solid CGI, or 3D CGI, suddenly came to the scene in the 1980s. With Tron, by Disney Studios, CGI was changed with what it could do. 3D was possible in the same scenes as live-action actors. As explained by computeranimationhistory.com, the film included the “first onscreen combination of CGI character and live action character.” All of this led to the art of CG as effects for live-action films, which would eventually disrupt the field of practical effects. The new field of VFX and CGI would also come to change what types of scenes we could see in movies and TV, not having to always use miniatures or physical sets for sequences. We also get to have 3D animation emerge as its own style of animation, next to 2D, with this introduction of solid 3D models in the scene.

In terms of 2D animation, CAPS made its way into the mainstream. According to tor.com, CAPS stands for, “Computer Animation Production System...” This process makes inking and coloring 2D animation a lot easier and quicker than traditional methods. Traditional methods would entail the artist inking a celluloid sheet with India ink before the cell would be sent off to coloring and would be painted on the back end with watercolor gouache paint. The way that the program would work would be to let the artist look at the rough animation sketch, then manually ink and paint over it with assistance from digital tools in the program. This program would have been used in the 1990s for films like Beauty and the Beast and Tarzan.

By the early 2000s, innovative programs would become known for 3D animation. Some are free to use, while others are paid subscription-based programs. Programs such as Blender, Zbrush, and Maya are industry-level programs that are even used by laymen at times to create projects in 3D. On the other end, 2D programs started to pop up as available for the public. In the 1990s, Adobe Flash made an enormous impact on the scene for animation, being also used in web design and video games to create 2D graphics. Another major program that came out at the time was Toon Boom Harmony. This program, while not containing all the useful tools like Flash, still became another industry standard, even being used to animate shows such as Family Guy and The Simpsons. In terms of lower-end 2D animation software, there is flip-a-clip, the first program I ever used, which has a free and cheap paid version. Another program that is for smaller artists is Procreate Animate, a new program coming out in November that is only a few dollars to buy and use on the iPad. All these programs do have their ups and downs, but I do see things like Procreate Animate becoming a new industry standard soon.

In terms of physical technology, animation has changed a lot. Originally celliod-based and paper-based when it came to creating animations, that soon came to change with the introduction of 3D animation and computer technology. Animators would come to use computers to create 3D images, at first with only mice since that was the only form of creating a picture on programs. Soon, modern technology came around. In 1964, the RAND tablet came out on the scene and was known as the first drawing tablet for computers. The tablets did not show the screen but worked as a separate device that you would draw on while viewing the results on the screen. Only in 2005 did the first screen-based drawing tablets come out, “Wacom has set a new standard in the industry” (Li, para 5). This new standard has changed the quality of work, making artists better able to pick up digital art and create it faster than before with regular, non-monitor, drawing tablets.

Animation has come such a long way in terms of technology and the ways that it is used in the process of producing an animated piece of media. This medium has also challenged what we can do, with companies like Pixar always inventing new processes with each production they create. While we have come such a long way with what we can do in animation, I am sure that we are far from over what is possible in the world of animation in both the 2D and 3D aspects of the process. As technology is advancing, we will be seeing AI start to help with streamlining the animation process along with creating new jobs cleaning up after programs, and making sure they properly stay on task. Though I would not like to see animation positions filled by AI, I still would love to see how they can assist in the process, and in any new processes that we may develop that would create a new level of quality in the field. That is what I forsee as the future in animation, and technology as a whole, besides possibly decreasing the time it takes to render an animation.

Overall, I am excited to see the changes in animation. What the future holds is only able to be guessed. Animation is an industry that I am very passionate about, so learning and seeing all the changes in the field over the time that animation has existed has been very enjoyable. The field will be changing in the future, and I am ready to see all the new technological changes that will be coming.

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