

# The classification and application potential of motion capture essay

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In the recent years, motion capture has gained significant momentum in not just biotech and I. T industries but also across the broad cinematic spectrum. Motion capture technology is flourishing in the film industry with its prolific use in Hollywood. Its awareness has been brought to mainstream audiences through blockbusters successes such as James Cameron's Avatar. With the continued growth of the entertainment industry, there is a strong desire for faster and more fluid animation. Current techniques for AD animation particularly frame by frame animation are time consuming and complex.

Frame by frame animation is the industry standard for creating animated characters. It involves constructing a AD model from scratch and tweaking the model's action one frame at a time. The pressure to keep up with demand and lower production cycles has driven producers to push for and experiment with motion capture, which has grown to be a significant source of motion data for computer animation (Connell). However with the revolution that motion capture has started, it has also ignited heated discussions in Hollywood about its classification and application. The controversy surrounding where motion capture should stand n animation has split critics into often polar extremes. This paper will zoom in on the animation industry, specifically animated feature films. There are two major issues that involve the use of motion capture in an animated feature. The first is the debate on whether motion capture should be classed as a type of animation technique when used in animation.

The second concerns the degree in which motion capture should be used in the production of an animated feature. This paper will argue that motion capture should not be classed as an animation technique but instead as a <https://assignbuster.com/the-classification-and-application-potential-of-motion-capture-essay/>

visual effects technique. This paper will also argue that motion capture has significant usage and potential in film, but in animated features the technique's still premature and cannot replace frame by frame animation.

**Background** To understand the reason behind the controversy surrounding motion capture, one needs to first have a basic knowledge of its mechanics and origins. Motion capture, abbreviated as mocha, can be defined as the process of obtaining and recording a three-dimensional representation of a live action performance or event by capturing an object's position and/or orientation in physical space (Liveryman pa-7).

Motion capture also has a myriad of other names including " performance animation", ' Virtual theater, " digital puppetry' or the " devil's rootstock" a term used amongst animation critics of mocha (Furnish). The diverse terms all reflect the challenge in defining this relatively new process. In the general audience's mind, motion capture is closely associated with the image of actors wearing skin tight suits with large dots stuck to them flailing about in front of a green screen. This image is what would be called optical motion capture, the process used mainly in feature films. This is when a performer wears reflective dots whose position in space is tracked by several cameras (Liveryman pa).

The digital readings are fed into computers where its data is interpreted into motion sequences by specialized programs. The sequences are then imported into a CAD program where it is mapped onto character models. A mocha artist will then use this set of information to manipulate and construct the final model. This technique is also used to create all the characters in

James Cameron's film Avatar. During the shooting of the movie, actors such as Sam Worthington and Zoe Saldan wore specialized motion capture gear and performed as they would on a live set. Figure 2 shows Saldan's facial expressions recorded by reflective dots on her face and the motion capture gear worn on her head. The data provided by the equipment is then fed to a computer where a motion capture artist will manipulate the data and construct the final CG model of a blue alien character seen on the left side of Figure 2.

Knowledge of where motion capture originated from is also critical in understanding the controversy. The ancestor of motion capture is a technique called arthroscopic used by Disney in the 1930s (Liveryman 2004). It is a process where an artist traces over recorded live performances, frame by frame (Furnish). The technique was invented to increase proficiency and decrease the economic cost of animation.

Arthroscopic was used even in animated classics such as Disney's "Snow White and the Seven Dwarfs". When the technique was introduced, it was censured by several prominent figures in the traditional animation scene. Some animators compared arthroscopic to cheating as it is a form of tracing. They also commented on the lack of artistry and aesthetics when the technique was used. AY Hierarchies, a notable caricature artist at the time criticized the lead characters Snow White, Prince Charming and the Queen in the film "Snow White and the Seven Dwarfs". He wrote an editorial for New York Times in 1938 saying that the characters were "bad drawn attempts at realism: they imitate pants-graphically the actions of their counterparts in

actual photography. " Snow White in particular is " an anatomic automaton. " and like a " ventriloquist's dummy.

" He concluded that " To imitate an animated photograph except as satire is in poor taste. " The character of Snow White was created when an animator traced over recorded live footage of a woman in a gown dancing as seen in Figure 3. The lines on Snow White were stiff with a disregard for traditional animation principles. This form of tracing meant that the essence and liveliness seen in traditional animation had been sacrificed for something that looked much more sterile in order to save time and cost.

Arthroscopic can be seen as similar to mocha as the latter also requires overlaying or tracing on top of pre-recorded data. Final production with mocha also results in certain sacrifices in artistry. The categorization Of motion capture Motion capture should not be classed as an animation technique but instead as a visual effects technique. Mocha is a far cry from what would constitute " animation" and its process is similar to visual effects. An interview with Jeremy Cantor, a computer animation faculty member of the Ringing College of Arts and Design reveals an opinion against mocha being identified as animation. Jeremy Cantor has animated professionally for nearly twenty years and is a former animation supervisor at Sony Mismanages . He provides a definition of an animation technique as " the manual construction of the illusion of motion and life," while motion capture is In essence " capturing motion that already exists" so thereby the two are opposites.

Mocha does not involve creating something new so it does not fit the definition of what "animation" is. Mocha in definition comes closer to what would constitute as visual effects, abbreviated as VEX. Visual effects refers to the range of processes where an image is manipulated or created to produce an effect that could not otherwise be produced with standard photographic techniques (Patella pa). VEX can also be seen as special effects. In post production, a VEX artist will modify an existing image or create an entirely new effect from scratch that is added to the final shot in the film. This is similar to the motion future process where raw mocha data is "manipulated" in post production to achieve a certain effect.

Therefore motion capture can be loosely classed as a VEX production technique. It is also important to note that many prominent figures and institutions reject motion capture as animation. The Academy of Motion Pictures and Sciences, a renowned organization that judges films and issues Oscar, released a formal declaration in 2010 stating that "Motion Capture by itself is not animation". A press release the same year on the 8th of July, the Academy stated that entries for its animated feature category would only include films in which movement and characters' performances are created using frame by frame technique. "The exclusion of the technique can be linked to its similarity to arthroscopic. Barry Weiss who is part of the Academy continued by saying that "in essence it's not different-at least, state of the art today - than rootstock was in thirties and forties.

Sean McLaughlin, a computer animation faculty member of Ringing College of Art and former animator at Trademarks Animation Studio also compared

mocha to the “ older animated films that used ‘ arthroscopic’, or tracing live action footage to achieve an ‘ animated’ look. Animators back in the 1940s had considered arthroscopic to be a shortcut for untrained animators. Lie Johnson, part of the famous group of Disney’s nine old men commented that mocha is “ by nature a cheat. ” (Jackson 32). These objections and harsh criticisms have resurfaced in face of the growing use of motion capture in animation. The barriers and professional viewpoints of those in the industry have barred motion capture as being considered “ genuine animation”.

There are however proponents for motion capture, notably director Robert Zemeckis, who pioneered its extensive use in his animated films such as Polar Express and Beowulf. The use of motion capture in these films allowed him to play with concepts of “ film reality’ and allowed him to create characters that are “ hybrids of recognizable face and impractical bodies” (Freedman). The use of mocha data here to is used as a tool to create something that is realistic but that would be otherwise impossible to create using traditional methods. Thus it follows closer along the lines of being a production technique to achieve a visual or special effect. Of course motion capture is still relatively new and its classification is fraught with intense controversy.

Cantor believes mocha is indeed “ an effective, efficient, and viable production technique” but it is still difficult to completely categorize mocha and exclude it from animation all together. Cantor says “ mocha data, like a photograph to a painter, can be great reference material or a launching point for the creation of a finalized character performance, but the untouched data

itself can't be considered animation. " Depending on how much the mocha data is manipulation, its classification can enter into a gray area. Cantor says when " an animator starts tweaking the captured motion in order to add exaggeration or improve pose silhouettes or fix prop interaction misalignments (etc), then the resulting motion becomes a hybrid between mocha and animation. Cantor's analogy is that " if an untouched photograph is not a painting, but if that photo is manipulated in Photos, then it becomes a bit of a hybrid work of art.

The more the photo is altered from the original, the more it ' qualifies' as a painting or illustration. But again, the original photo itself is still only a captured image until an artist alters it significantly enough from the original. " The same would apply for animation ND motion capture. Untouched photograph would no doubt be disqualified in a painting contest as untouched mocha data would be disqualified as animation.

But the lines drawn becomes blurred when mocha data gets " cleaned up, altered, and improved" by an animator which Cantor says " pretty much always happens. " Cosmetic's Polar Express was amidst an intense debate about its eligibility as animated film due to its extensive use of mocha. The ultimate deciding factor for its consideration as animation by the Academy was the fact that frame by frame animation was used over the motion-capture (Wolff). Overall, the larger the degree of manipulation of the motion capture data, the more difficult it is to categorize. In these instances, we can only rely on the judgment of professional organizations like the Academy of Motion Pictures and Sciences . Artistry and value of motion capture in the



production of an animated film Motion capture technology is still premature and frame by frame animation remains the predominant technique in the production of animated films. One reason is that despite producers' claims of mocha as cost saving and time saving, raw mocha data requires significant manipulation by skilled individuals before it can be considered viewable.

Cantor dispels the idealized image of mocha as he says “ animators get a bit annoyed when mocha is hyped so much on TV shows and in filmmaker interviews that often make it sound like the performances are captured from the actors and then a technician simply presses a button and that data is magically and perfectly applied to the digital characters of the given film, when it truth, most of the time, it takes a huge amount of work from qualified animators to turn that data into the final performances that are seen on screen. In recent years, for instance, Andy Series, who was the performance-capture actor for Peter Jackson's Googol (in LOTT) and King Kong, famously neglected (or some say, refused) to acknowledge the contributions of the dozens of animators who tweaked, exaggerated, and improved his captured data before the motion was considered finalized. Nothing against Series' performances, which were certainly brilliant, but those performances were group efforts and he basically made it a point to take solo credit for them. “. His view about the significant contribution of the animators is shared by several other notable figures in the industry. Jerome Chin, the senior VEX supervisor for the film Beowulf, articulates the process that mocha data has to go through in post production.

Chin described in an interview for Variety magazine the limitations Of raw mocha data saying that " it won't record volume, meaning if the actor squints or purses his lips, it tells you when they did it, but it won't tell you how much they actually moved. So that in each shot, the animators must decide how to interpret those timing cues. There are other cases where we may use almost none of the data," Chin also said that the film had more than 60 animators weakening the mocha data for a year and that " not a single frame of the movie that didn't need to be touched by animators. "

(Debugger) . Alex Lindsay sheds some light on the issue and process associated with mocha. He wrote in a publication for AD world magazine in 2000 that " mocha is expensive in the beginning (system costs and internal development expenses are very high), the return, theoretically, is the ability to capture complex motion in or near real time, if done correctly, a motion capture team can capture material in a single day that would traditionally take months and months to create. The problem is that it's never done " correctly. " Motion capture still lies on the bleeding edge, and most who have experimented with it have experienced more of the bleeding than the edge.

Shortcomings can include picking the wrong capture artists, spikes and warps in the data, improper direction of the capture artist, and changes to the scene after the motion capture. These issues often render mocha data completely useless... It is clear from these findings the process of finessing the data into finished product is nothing short of laborious. It is also crucial that specialized workers rained in the field and personnel with adequate understanding of the technology be hired for production. A fair conclusion

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can be drawn that the technology should be employed with one a certain degree of caution and dads Tate research should be done before hand. One must be knowledgeable enough about the process to gauge the potential benefits and costs of utilizing this technology in production.

Another reason mocha may not be effective in production is due to concerns over artistry. The disdain for motion capture in the animation industry is rampant. Lie Johnston, a famous Disney animator, insisted that digital frame by frame) animation can achieve great heights of artistry however he does not think motion capture ever will (Freedman). In Brad Bird's 2007 Oscar winning flick "Ratatouille", the end credits has a disclaimer that reads "100% Genuine Animation! No motion capture or any other performance shortcuts were used in the production of this film. " (Freedman). This reflects a certain attitude from the production team or at least the creative culture of Paxar that prides itself on doing animation frame by frame.

It is no secret that the creative team viewed mocha as a " production shortcut". There are animators ho continue to view mocha as a technical " cheat" regardless of how the data is manipulated. When asked about the use of mocha in animation in an interview, director Brad Bird also referred to Googol as an example when he says " Andy Series did a magnificent job physicality that character for Lord of the Rings, and I think that's brilliant. But I also know that those scenes were massaged a lot to look the way they do by animators after the raw MO-cap. " Bird emphasizes the importance of the additional artistry that is required to manipulate the raw mocha data. Without it he claims we cannot get the " nuance of real actors and "

selective caricatures of animation. ” (Plat). Bird further elaborated on his example of Googol in the interview.

He said “ The most emotional scenes of Googol” were animated. The scene that impressed Bird the most was “ where he says, ‘ Smidgen? ‘ And he starts to remember parts of himself that he’s forgotten, and you can see it in his eyes and it’s magnificent. And I found out that that was entirely animated.

It was not MO-cap. And that’s what people don’t talk about,” (Plat). The use of animation allows the creator to tweak and input their own interpretations to allow for a visually enticing final reduce that may otherwise not be possible with mocha. When used inappropriately, mocha can create cardboard looking characters with a certain rigidity that lacks the essence of something that is traditionally and painstakingly created with frame by frame.

An example would be the film “ A Christmas Carol”, which was ripped apart by critics and motion capture was largely to blame (Freedman). As Todd McCarthy puts it the process had “ drained the actors of emotional warmth and expressive nuance”(Freedman). Cantor sums it up by saying “ When it comes to creating realistic human motion then mocha has great potential and can be effective.

But since the majority of animation that’s produced for films, involves stylized or exaggerated motion applied to animals, monsters, aliens, robots, cartoon characters, or otherwise ‘ inanimate’ objects, like toys, cars, or Lox

lamps, and in those cases, there's no substitute for the artistry of keyboarded/frame by frame animation. " Mocha has very limited capabilities in terms Of abstraction and the technique is most appropriately used where realistic performance recordings are needed. Animated movies like " Hotel Transylvania" employs frame by frame animation effectively as the characters are very abstract and stylized. The lead character Drachma in the film has abstract features with a very elongated chin and sharp nose . The result is an artistic and visual success.

On the other hand, movies like Avatar employ mocha for its animation. It is effective due to the need for realism in the film. The Navies (the blue alien race) are meant to looks like real life creatures.

Mclaughlin applauded the use of mocha in films such as " the Hobbit, World War-Z. Rise of the Planet of the Apes" and criticized its use in all the " animated" Eczema's features such as polar Express and Beowulf. There is a track record of success when mocha is used in these films. Thus mocha is more more suitable when applied in live action films where there is a demand for realistic character movements. There is however a bias against mocha in the character animation community. The criticism of mocha by the animation community may not be merely from an artistic standpoint. Alex Lindsay, in a publication for AD magazine explicitly stated that a bias formed because animators " see it as a threat to their livelihood". He shows support of mocha by saying that it is able to capture a " level of detail" and " information that neither the characters animator not the layperson ever consciously see but routinely reacts to in heir normal lives".

Though skilled animators provide the fluidity, feel or heart to a character, no human can match a machine in terms of accuracy and capturing minute details. To add to the concern over artistry, the idea of “ Uncanny valley’ must also be examined. Uncanny valley refers to the unpleasant response we get when we see something that is close to to human but not quite. It’s the revulsion we feel when we see life-like dolls or zombies. They have all the features that are human but we feel that there is something “ off’ so we deem them as eerie or unpleasant. A more scientific explanation stipulates that there is a level of emulated reality that can be reached in human aesthetics that can elicit a negative response in viewers (Stiffening). A study published in the National Academy of Sciences suggest it is “ because the realistic synthetic characters elicit the concept of ‘ human,’ but fail to live up to it. That is, this failure generates feelings of unease due to character traits falling outside the expected spectrum of everyday social experience.

” (Stiffening). This is an issue that filmmakers to try to actively avoid. The misuse of mocha can result in unpleasant films for the audience. McLaughlin states that “ Robert Eczema’s s a prime example. He’s a brilliant Filmmaker. He’s given us Castaway, Back to the Future, Forrest Gums etc.

.. But his Motion Capture films are abysmal, and have put the term ‘ uncanny valley’ onto the mouths of many audience members.

Reviews of Robert Gimmick’s 2004 animated film Polar Express showed that viewers found the film unpleasant or uncomfortable. The characters, constructed using mocha, caused many critics to consider it uncanny valley.

Paul Clinton from CNN wrote, “ Those human characters in the film come across as downright..

. Well, creepy. So The Polar Express is at best disconcerting and at worst, a wee bit horrifying. Animation director Ward Jenkins criticizes the deadness to the characters faces, especially in their eyes and eyebrows. While the Polar Express caused distress and negative reactions from audiences, Avatar has largely succeeded in overcoming the uncanny valley. The characters in the film are realistic and visually pleasant to the viewer . Cameron himself said he had the idea for the film since 1994 but waited around 15 years to make it because he was waiting the necessary technology. Mocha may be new but one cannot ignore the pace at which its technology develops.

For example, a new development in 2011 called Motions, a AD action capture system used in Rockets Games’ “ L. A. NOIR” has already been touted as the breakthrough in overcoming the uncanny valley (Broughams). Motion Scan can record many angles simultaneously to create a AD image. This would allow it to capture human expression in as much accuracy as possible so that it feels and looks natural on screen.

Motion Scan promises to not only improve post production processing time and budgets as compared to traditional methods, but also boost the quality of performances. Both examples provide an optimistic outlook on mocha in its future application. Conclusion Motion capturer’s similarity to special effects would place the technology suitably in the VEX category. It is clear from the rejection of the technology by the Academy and many prominent figures that it cannot be classed as an animation technique. However we

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cannot completely exclude it from animation. The lines between the two categories can be blurred depending on the degree in which raw mocha data is manipulated.

The technology has shown to be effective in live action to generate realistic human motion however its use in stylized and abstraction for more cartoon or caricature animations is limited.