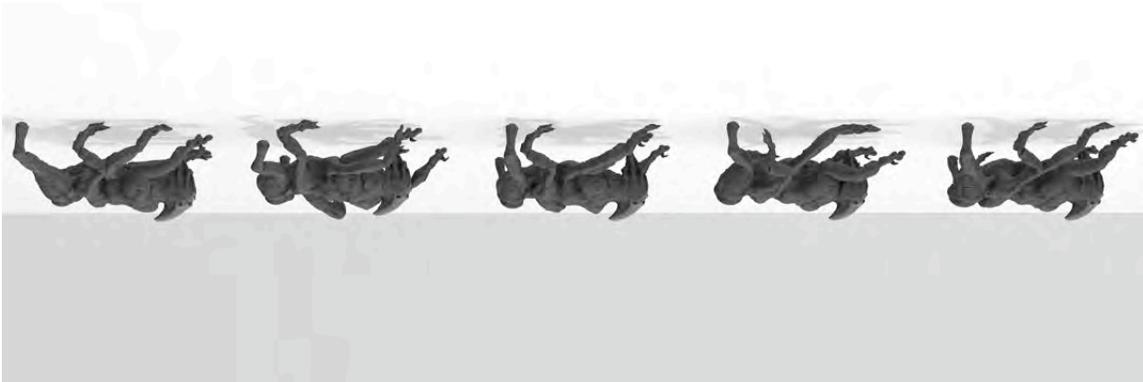
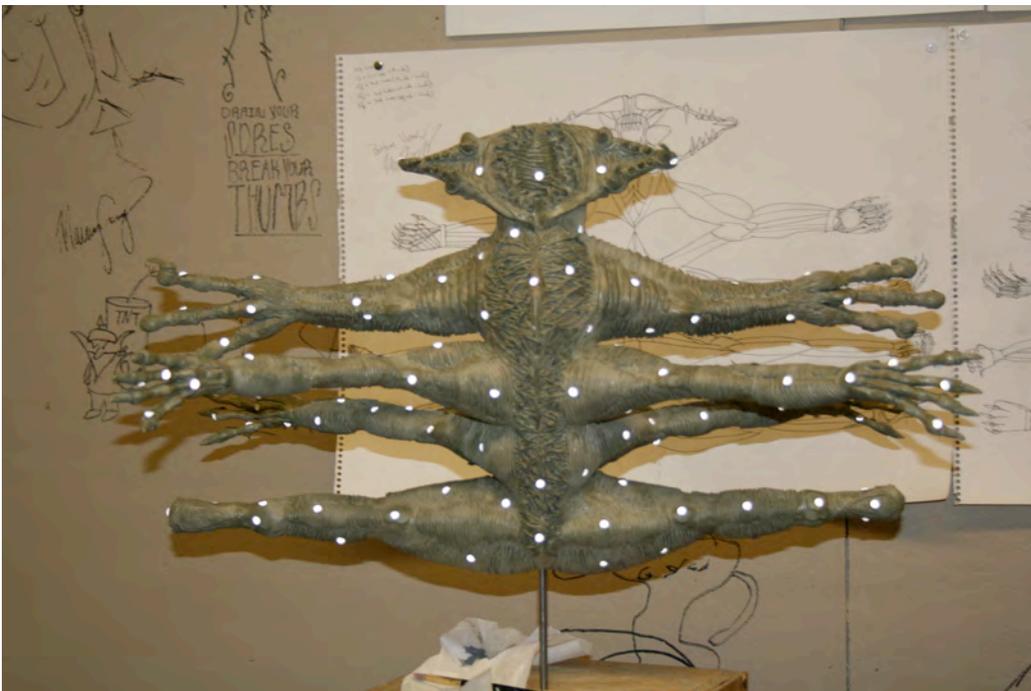


I am a sculptor and I am an animator. Often these professions may be viewed as separate and unrelated. However, since I love being both and desire to do both, it was important to choose a project that not only let me sculpt and animate, but also created the need for it. Such a project would allow me to use my two favorite skill sets while also demonstrating a way they could both benefit one another in making a piece that showed off both of these skills. To draw inspiration I looked to the movies. In Hollywood, a studio will often use a real world object and incorporate it with computer graphics to achieve a more desirable result. Whether it was a villainous half shark man or a kind and noble dragon, studios often use organic shapes from real-life to create more believable computer animations than creation done only using the computer can achieve. Through the use of 3D scanning technology, I saw a bridge that could be used to combine a highly detailed clay model with the smooth and precise animated movements of a 3D computer character. My project is an effort to show how harnessing the benefits of both my animating and sculpting skills creates a creature that is more organic in form and movement than one created solely on the computer.



The first benefit I have in working this way is that it allows for more thought about form, movement, and texture to go into the work because of the extra time spent on sculpting it in clay first. Sculpting allows me to see how the creature will be through the use of my eyes and, just as importantly, my hands. This simple fact means that my creativity only needs to flow from my head to my hands to my model. The middleman, the computer, is cut out which makes the design process of my creature more loose and organic which is exactly what an animator trying to make the illusion of a living thing wants. Clay also allows for more experimentation than computer modeling. While it is true that a great deal of the conceptualization process for a character can be done through sketching, nothing about this is for certain until it is in 3D, whether that is in clay or on the computer. Consequently, making big changes in clay is easier than digitally because it's simpler to return a part of the model to its start and not affect the rest of the model. With digital modeling, however, the entire mesh would have to be restarted or perhaps a lot of complicated edge sewing would have to be done.





For instance, I decided to completely change the mouth on my clay model while I was building it. From my original sketches I had decided to go one direction with the mouth, but once I had actually built the mouth in clay I realized the other way was more original and added more character. All I had to do was cut off the original and start the new one in the same spot. To do the same thing in a 3D modeling program would have meant deleting the digital faces that made up the mouth, creating a polygon with the same number of vertices at the start of the throat, and then painstakingly sewing them back together. In short, any major change to the shape and layout of the creature, if done digitally, would be a very time intensive process. Consequently, because I was not building with a concrete design but with a strong idea, any creative revisions were very easily worked into the clay. Through many revisions and thought, an artist is making not what they imaged, but creating something entirely different and better. Nobody gets it right on the first try.

Once enough time has been spent working with the clay, I can go into the computer and focus more closely on the creature's outside and inside. Since I'm not constrained by the size of my fingers, tools, or even being unable to see inside of the creature, I can get in as close as necessary to fill in details my clay model might have left out. By using both clay and digital modeling I can make a creature that blends the advantages of clay modeling with the precision of a computer.

Clay also allows for something that is very hard to do on the computer, asymmetrical modeling. Digital modeling not only encourages the user to model symmetrically but most 3D modeling programs have a feature included specifically for this. This makes sense from a purely commercial standpoint because the modeling process is faster, but the drawback is that nothing in nature is perfectly symmetrical. As a result, when a person wants to make an organic object they have to work against the computer to achieve asymmetry whereas this happens naturally with clay sculpting. Another outcome of this process is the movement of the creature is also pushed in the direction of being more natural. For example, no person has legs that are the exact same length; therefore, no person has a perfectly balanced walk or run. By having limbs of slightly different lengths the creature is also benefitting from the clay sculpture because the animator is then forced to compensate by changing the gait of the creature so it is not perfect, and consequently unnaturally, balanced. Taking note that the asymmetrical creature on the left and the perfectly symmetrical one on the right one can see that the one on the right looks more static and inorganic than the one on the left.

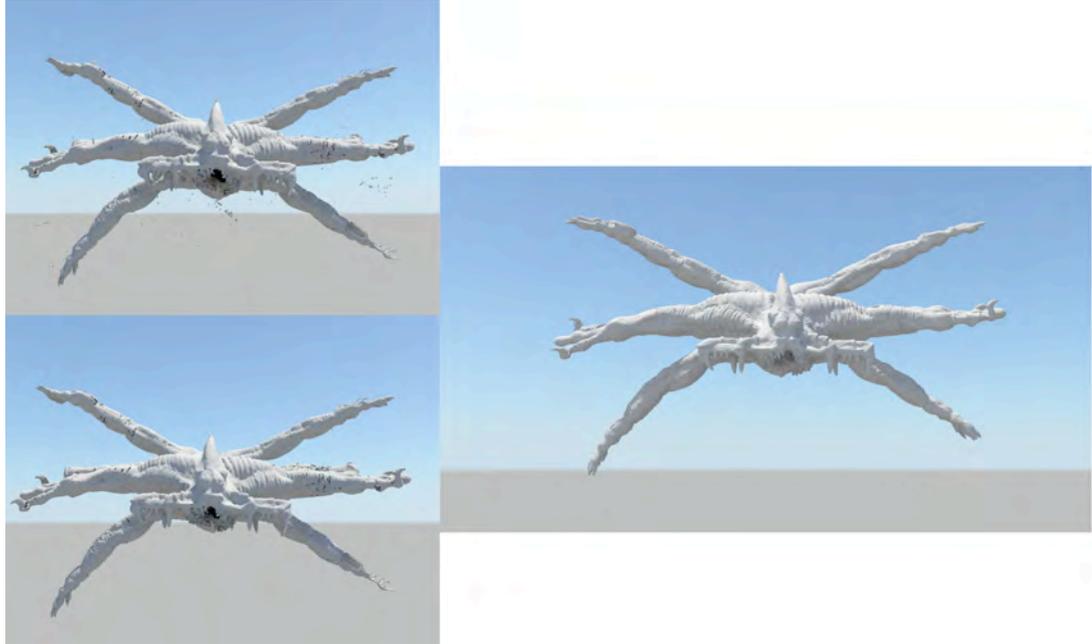


Looking at the shoulders of the creature, especially the 3<sup>rd</sup> set from the head, we can see that on the left the creature is asymmetrical which is what a person would expect from an animal in motion and not a perfectly symmetrical running robot on the right. Also take note of how unnatural the straight line of the eyes is on right creature compared to the left.

A major step in this project is the use of a 3D scanner. There are many different reasons for using 3D scanners. A museum might 3D scan specimens for easy and safe sharing, a sculptor may want to make a digital print of their work with a different scale, an actor's head might be scanned to make a digital copy of it, or to preserve a precious artwork forever in the digital realm. For example, a 3D scan of Michelangelo's *David* by a team of students and professors at Stanford took 1,080 man-hours to finish and consisted of two billion polygons.<sup>1</sup> Certainly, something more akin to what my project is would be the 1996 film *Dragonheart*. To create the dragon for the film Industrial Light and Magic made a five-foot long model and then scanned it into the computer as a starting point for the digital model. This was done because the dragon was a main character in the film and also had to mimic Sean Connery's facial expressions, which meant that an unprecedented amount of detail had to go into the model. The original plan had been to animate the actual scan but it was decided that it needed to be trimmed down to save animation time. Even after the trim the dragon still had almost three times as many points of animation than the T-Rex from *Jurassic Park*.<sup>2</sup> However, with the recent inven-

tion of the highly useful tool decimation master in the 3D program Zbrush, a person can very easily reduce polygons on an object without a evident loss in detail. Knowing this, the ease of animating scan data is much greater that it was back in 1996. More recent examples of physical models being scanned into the computer for use in making digital models include the films *Pirates of the Caribbean: Deadman's Chest* and *The Curious Case of Benjamin Button*. In *Pirates* many actors are seen as creatures that were once men but now look more and more like sea life. To make this happen each actor's head was 3D scanned and then used as a starting point for the eventual form they would take in the movie.<sup>3</sup> In *Benjamin Button* 3D scans of life casts of the actors were used to create digital models for the final animations to great success. Obviously, since there are no beings that look like my creature in real life I had to make it out of clay.

I'm not working with the same kind of time or budget of any of these projects, but it is important to remember that my scale is much smaller and that the technology is more accessible than it was back in the mid '90s. It is because of the advances in technology that a single person working on a senior art project can have access to 3D scanners. By using the process of scanning a physical thing and taking the extra time to create a digital mesh from it major studios, and myself, obtain more organic and natural results. Yet, the scanning of the clay model is hardly perfect, notice the top right picture on the next page. In fact, to get this resolution I needed twenty-two separate scans to be done and then I had to go through the process of combining them to make a unified object. Even then there were still holes in the scan data that had to be fixed. In the end I believe the cost in time was well worth it for the results.



This project allows me to wear both of my favorite hats, animator and sculptor. Both have been used in the past together with great results. In fact the results were so good with *Curious Case of Benjamin Button* that the actor who played Benjamin couldn't tell where the computer character was taken completely out of the movie and he was put completely in<sup>4</sup>. Modeling and digital modeling used together makes sense; by using them together my project is stronger and has better impact with the audience because the creature has a more organic feel than something done exclusively on the computer. The computer is just one of many steps in the process and not everything that needs to be accomplished to make a successfully moving creature can be created exclusively on the computer.

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