Completing My Demo Reel: The Process Behind FX Animation

An Honors Thesis (ART 490)

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Abstract

In this paper, I demonstrate the process of animating different types of 2D FX animation. I explain the technical terms and how to animate using programs such as Toon Boom Harmony, Autodesk Maya, Adobe Photoshop, and Adobe After Effects. I walk through the process of animating the different projects starting from the conceptualization to the final product. I conclude with how I compiled my finished work into a demo reel for professional use following graduation.

Acknowledgments

I would like to thank all of my animation professors Brad Condie, Hauli Fu, John Ludwick, Zachary Craw, and, most importantly, Andy Beane who acted as my academic adviser during ART 490. In my 3 years in the Animation program, I learned a multitude of helpful skills and gained insight about the art of animation from all of these wonderful professors. Their teachings are what propelled me forward to where I am now to complete my final semester and demo reel.

Introduction

Ever since I could hold a crayon, I have been making art. Over the years, I indulged in other hobbies and activities such as theater, dance, and choir. In school, I was an honors student who excelled in academics. By junior year of high school, my dad was sure I would go into acting to be on Broadway and my mom *suggested* that I go into STEM. Despite being one of my oldest interests, when I announced during my senior year that I wanted to major in art instead, it still came as a surprise to my family. Specifically, I wanted to be an animator. I had made up my mind that I wanted to do 2D character animation. Things turned out to be even more different than I thought. First of all, I had to get into the animation program. After a harrowing portfolio review and a lot of self doubt, I did manage to do it.

Once I was in the animation program, I found that my character animation always looked stiff and lacked expression. It was discouraging. Then one assignment handed to us was to make a looping fire animation. I found myself indulging in this project more than the other assignment we were given at the same time. That should have been the first sign that FX animation was my calling. Instead, I chose to ignore it but it was always at the back of my mind. It wasn't until my junior year when I was getting bored of character animation, we were given an "open assignment" to do *anything* we wanted. After a lot of debate, having feelings of self-betrayal, and even receiving guidance from my professor, I made an animation of flowing water and loved it. I finally admitted to myself that I wanted to be an FX animator.

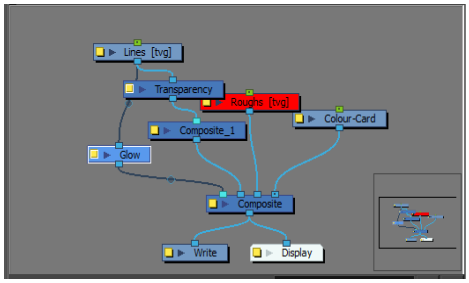
By the last semester of my senior year and my 3rd year in the animation program, I had one more class to take. ART 490, or Senior Project, is the equivalent of a Capstone Project for animation. My professor supervising the class and also my academic supervisor for this paper is Andy Beane. The purpose of ART 490 is to create work to put into a professional portfolio

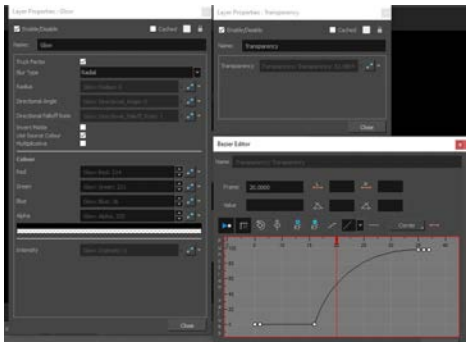
and/or professional demo reel to demonstrate our skills as animators to potential employers and clients. We also took the time to discuss some professional advice such as how to write a resume, how to manage social media accounts, and how to create a website to display our work. Because the animation program in the BSU School of Art teaches its students a range of animation skills over the course of three years, there isn't enough time to specialize the skills in the field one wants to work in. There is a specialty class animation students take during their junior year, however, the only specializations the class focuses on are modeling, rigging, and character animation. Hardly any room for FX animation I must say. That being said, when it finally came time to make work in ART 490, I was ill-prepared to jump straight into FX animation. Fire, water, smoke, and a plethora of other effects don't move the same way a human does. I decided that I would start small and dip my toes into the water instead of jumping right into the deep end so to speak. I would start with a series of short, 1 or 2 second FX animations that I could whip out quickly to warm up.

Technical Terms to Know

However, before I start with my process analysis, I think it would be best to explain the terms that are familiar with animators but not the uninitiated for a more clear understanding. Like movies, which are actually just a bunch of pictures played in rapid succession, animation operates on the same principle. Animation is the process of using images and displaying them in progression to give the illusion of movement. 2D (two-dimensional) animation uses 2D elements that can be made traditionally or digitally. 3D (three-dimensional) animation is done on the computer with the use of CGI (computer-generated imagery). Stop-motion animation is the process of taking photographs of real objects and slightly moving and/or displacing the figure with each picture to give the illusion of movement when the images are played in succession.

Toon Boom Harmony (usually shortened to just Toon Boom) is a digital 2D animation program. Autodesk Maya (usually just shortened to just Maya) is a 3D animation program. Sometimes, we use Adobe programs such as Photoshop as a drawing program and After Effects as a video editing software. When animating in 2D, frames refer to the "drawings" that make up an animation. Framerate is how many frames are played within a second. The industry standard is 24fps. Animating on "ones" means you draw on one frame at a time and "twos" are when you draw on a frame that lasts for two frames. An animation drawn entirely on twos would technically be 12 frames in total but still going at 24fps speed. Drawing on twos makes the movement appear more slow and ones makes movement more fast. There are two techniques for drawing frames - using either pose to pose animation (completing the more important "key frames" first and then completing the frames in-between) or straight ahead animation (starting from frame one and drawing each subsequent frame in order). The timeline is where these frames are "located". Layers are separate layers to draw on, like if physically stacking up a pile of papers, and dictate the order of how the drawings will appear if layered on top of each other. A "rough layer" is a layer meant for sketching out the base idea of what the animation will look like and is not meant to appear in the final product. Any "final layers" are traced over the rough layer and smooth out imperfections of the rough drawing. Toon Boom also has a node system, in which a "node" can be applied to separate layers to add special effects that can't be easily hand drawn, such as glowing or transparency. These nodes can be "keyed". Keys are started and end



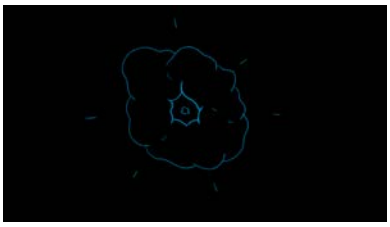


reference points over the course of multiple frames. By keying something like a transparency node, you can change the amount of opacity a layer has over the course of the animation. If you key the transparency at 100% opacity on frame 1 and key it at 0% opacity on frame 10, then the layer will smoothly transition from 100% opacity to 0% transparency over the course of 10 frames, giving the appearance of that layer fading from existence. You can key any numerical value between 100 or 0 depending on what is needed for an animation. In the 3D program Maya, one can make 3D objects and spaces by using preset polygons that can be reshaped using sculpting tools. When animating in Maya, an entire object is animated by keying its position, rotation, and size to move it around. Like how a transparency node will gradually change opacity over the course of frames that are between keys, the object will appear to move around, rotate, or increase/decrease in size based on the keyed values. Rendering, used for both 2D and 3D, is taking the animation and turning it into a high fidelity video by taking the individual frames and playing them the correct sequence at the correct speed. This usually takes up a large chunk of time to make sure the images are rendered at full quality. In Maya, playblasting is the process of creating a video from the animation but unlike a full render, it is much quicker to render but at the cost of quality. Playblasts are usually used to watch a real time playback of the animation (large programs such as Maya often lag unless they're running on an expensive high quality computer) or for a quick video when you just need to see the animation for reference and the quality doesn't matter.

Project #1

Getting to the point, the first of these "FX Tests" was a classic explosion. I had seen plenty of explosions in film and TV. They tend to happen in any form of media with an action-heavy plot. But seeing as I am still wet behind the ears, I had no idea where to begin in

animating an explosion. So I applied knowledge from traditional art to guide me: learned through observation. I sorted through a variety of videos of explosions and FX animations on Pinterest, and slowed them down so I could observe the way the sparks flew and the smoke wafted in the air and dissipated. After watching the same videos over and over, I finally felt I had an understanding of a good starting point. I opened up Toon Boom and made my rough layer. I drew with a straight-ahead approach, drawing frames as I went instead of drawing keyframes first and then filling in the in-betweens. I started with a small starburst,the spark, in the center of the screen and worked my way up to a bigger starburst within the next few frames and added a smoke cloud in the center. The cloud then grew larger around the starburst until it was engulfed in the cloud which started dissipating in the center and began breaking off into smaller smoke plumes until they shrunk and dissipated into nothingness.

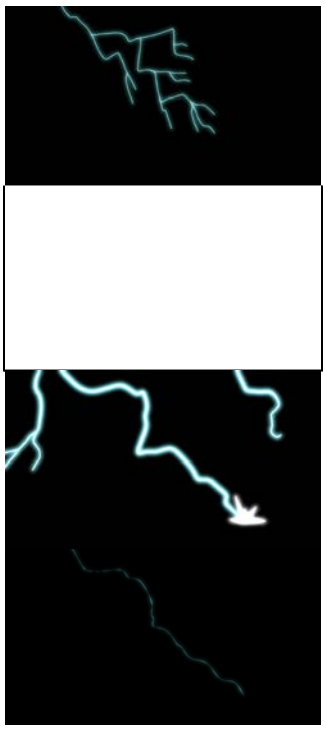


With some tweaks in the shape of the linework, I had the movement down and could proceed with the finished layer. I wanted the explosion to look hot, so I traced over the initial spark with yellow and up to where the smoke started forming, I wanted the smoke's appearance to be gradual, not a sudden gray blob. I colored the center of the cloud the same yellow as the initial spark and graduated outwards from yellow, to orange, and then the outermost layer red, with some red plumes within the smoke cloud to give the cloud a thicker appearance. As the smoke cloud started to dissipate, I started to dull the colors with each frame until the cloud was a uniform gray. The coloring was done and I played back the video. The explosion looked okay but it didn't have enough kick to it. I racked my brain for what extra bells and whistles I could add and the first that came to mind was adding a glow node so the explosion could actually glow. I

keyed the intensity of the glow so that it was bright when sparking but dulled and disappeared by the halfway point so that the smoke wouldn't be glowing. I also added a complete white-out on the frame where the spark reaches its largest before turning into smoke. It would cover the drawing I took time to do but after replaying the video, it was certainly the right choice because it truly made the explosion pop. The last grievance I had was with the smoke. While the dissipating smoke plumes got smaller, they were still solid and didn't look like they were realistically fading away. I attached a transparency node to the final layer and keyed it so the explosion and smoke were solid until about halfway through and gradually grew more transparent as the smoke dissipated. With another playback, the explosion looked stunning. It was time to move on to a new test.

Project #2

The second effect I wanted to test out was lightning. Lightning moves even faster than the explosion needed to, and gave me the challenge of making a snappy animation. Like I did



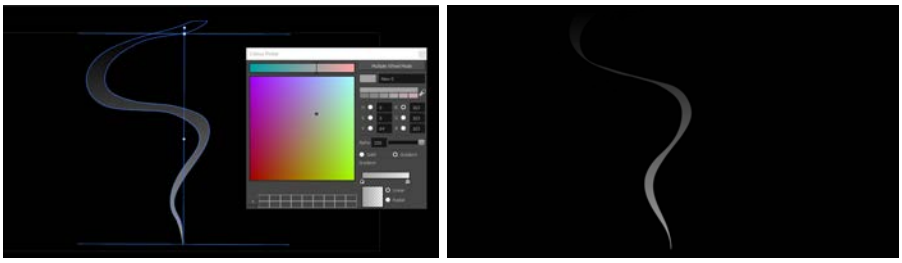
with the explosion, I searched for multiple videos of lightning striking and slowed them down to truly grasp how lightning moves and looks while in motion. When I opened Toon Boom and initially the length of the animation, I knew I was going to work in ones instead of twos because of how fast the lightning would need to move. I made a layer with a single frame that extended for the entire duration: an X in the bottom right side of the screen that I would later delete to mark where the lightning would strike to know which direction I was moving the lightning towards and keep that movement consistent. While drawing in the rough layer, I played with the jitter and the thickness of the

“tendrils” of lightning. I started in the top left corner to move diagonally towards the X. The lightning started out thicker at the top of the screen and tapered to a thinner size towards the bottom of the bolt. After striking, the lightning bolt which had been a long zigzagging line grew slightly more straight as well as thinning until it was nothing, all within a few fast frames. When coloring the lightning, I made it a very bright pale blue. Like I did with the explosion, I added a few frames of a complete white out when the lightning struck to create the appearance of lightning flashing when it strikes. With a few playbacks, I felt one final thing was missing: a little spark on the “ground” where lightning struck. I added a little starburst that shrank as the lightning disappeared and that was it.

Project #3

I finished the “FX Tests” by animating a wispy smoke cloud, like the type of smoke from blowing out a small fire. Unlike the previous two subjects, I couldn’t find any live action videos to use but I did find plenty of 2D animation gifs and tutorials that demonstrated the way wispy smoke moves upward and oscillates which was more than perfect. Like I did with the lightning, I placed an X in the bottom center of the screen to mark the source of the smoke where it would remain stagnant while the rest undulated upwards. When making the rough layer, even with the help of tutorials, it was hard at first to conceptualize the smoke moving side to side while simultaneously moving upwards. After watching the playback multiple times and some serious tweaking, I had a very rough animation of wispy smoke. However, that is what the rough layer is for. For the final layer, I smoothed out the lines while tracing over the rough layer using a light gray. I was initially unsatisfied with the final product not because the animation was bad but because something was missing. It was too solid to look like wispy smoke but giving the entire layer transparency wouldn’t truly capture what I was looking for. I eventually figured out there

was a way to do a transparency gradient by creating a custom color. I replaced the original plain light gray with a light gray to transparent gradient and directed the gradient upwards. The bottom of the smoke would be a solid gray but gradually grow more transparent as it moved upwards which gave the proper appearance of the smoke dispersing.



Project #4

The next project I wanted to tackle would be much longer than 1-2 seconds. In fact, the final animation ended up being 11 seconds. The project I had in mind was to animate a firework show that I could experiment with different ways the fireworks could burst. When I first started on the rough layer, I made a dot in the middle of the screen and in each subsequent frame drew lines coming from the dot further and further out until they petered out into dots which then exploded into more dots until they filled out a large circular shape. I had them fall for a few frames and then I went back and erased different dots in each frame to give them a twinkling effect as they dwindled out. This was a large firework and I ended up putting it towards the end as part of the “finale” for the firework show, despite being the first firework I animated. For the others I drew multiple different styles of fireworks. Some exploded in the same manner as the very first one. Others exploded and formed a weeping willow-esque shape while fizzing out. One burst out in a spiral. Another burst like the first one but instead of exploding into dots, it exploded into tiny lines. Overall, I made sure to layer these fireworks over each other all across the screen for the first half and then the very first firework I animated ended up being the third to

last firework to go off, having the screen to itself, followed closely by the same firework duplicated. For the ultimate finale, I made a firework that exploded into a heart shape, using the same sequence as the first firework but changing the finishing shape into a heart instead of a circle. After all of that, I still needed to add color. Instead of one single final layer like I did with the FX tests, I made 4 separate layers for 4 different colors: blue, green, gold (yellow-orange), and a red/pink layer. All of the fireworks leading up to the final firework were the first three colors while the heart exploded into a light pink before turning red. I then added a glow node to each layer to give the fireworks that fiery explosive effect. But fireworks glow at a brighter intensity before fizzling out so I had to make sure to key all the glow nodes' intensity at different intervals throughout the whole 11 seconds seeing as multiple fireworks were on the same layer. When the entire process of animating the fireworks was done, my peers and professor suggested that I needed to add the fireworks into a context instead of a plain black background. I first scaled all of the fireworks down in size a bit and shifted them over into the top right corner of the screen. Using a sketchy pencil style, I drew a sky at sunset graduating from a dark purple to yellow from top to bottom behind the fireworks. In front of the fireworks, I made a black silhouette of a tree line along the bottom half of the screen, then on another layer in front of that one, drew a dark gray silhouette of a couple in the bottom left corner. As a finishing touch, I drew a "rim light" on the couple that I added a transparency node to that I keyed to rapidly fluctuate between 0%, 50%, and 100% opacity to give the impression of the firework's rapidly flashing lights reflecting off of the couple. Other than the fireworks, nothing moved; not even the point of view.

Project #5

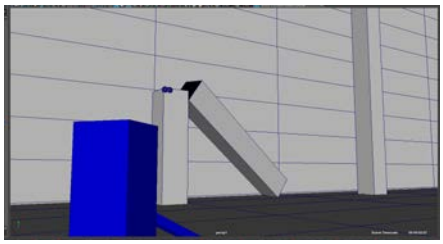
For my next big project, I collaborated with a fellow senior animation student who wants to be a 3D character animator named Fletcher Spence. Being a fan of Spider-Man, Fletcher had done an animation of Spider-Man flipping and swinging through a city that he wanted me to do 2D drawover effects for. He wanted them to be similar to the box office hit “Spider-Man: Into the Spider-Verse” that incorporated 3D animation with the flat traditional superhero comic style. When it came to animating over this, Fletcher had exported a video of the animation he had done and I then imported that video into Toon Boom, which then refitted the video into its individual frames on its own layer. I created a layer over the video and drew out rough ideas of different effects I could possibly add. Most of them were classic comic book sound effects like “wham”, “thud”, or the classic “thwip” that happens when Spider-Man shoots his webs. There were also others like motion lines for when Spider-Man jumps or the wavy lines of his spidey sense going off. I didn’t find these types of effects to be very expressive or partially complicated but it was an interesting experiment in trying out the graphic comic book style I hadn’t tried to draw in before. At two separate points at the beginning and end, I paused the video for a few seconds to draw over the frozen frame to look like a comic book panel. Once I completed the rough drawover, I ended up drawing most of the effects in their own separate photoshop files to use as assets all of which included the overzealous use of “ben day dots” for that special comic book feel. I then imported the original video into Adobe After Effects and using the rough drawover as a guideline, I imported the photoshop assets into After Effects as well and keyed their scale, position, and

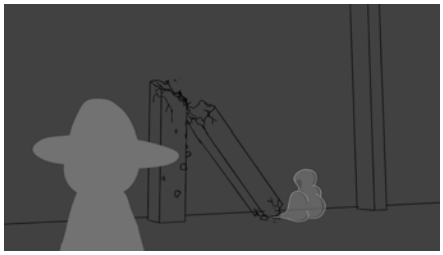
rotation to give the appearance of a word or even separate letters popping up and bouncing out as each action that required them was done. Because there were two creators who contributed to the animation, I added credits at the end that distinguished Fletcher as the character animator and me as the FX animator. As a nod to the "Into the Spider-Verse" movie, I drew our names in a graffiti-like font.

Project #6

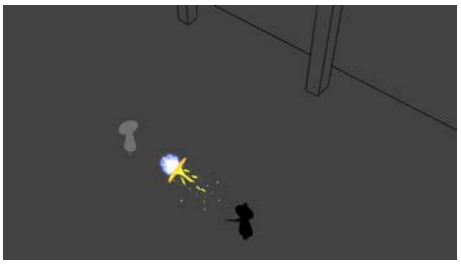
When it came to the final project I wanted to do in this class, I wanted to do another animation with a lot of movement that wasn't in a fixed position like the fireworks but also allowed me more artistic expression than the drawover effects I did for the Spider-Man animation. I decided I wanted to do a magic battle between two witches throwing spells at each other. It would give me the chance to do multi-faceted FX animation with the spells sometimes interacting with each other or the environment for an added layer of complexity. Not being a background designer or character animator, I still had the challenge of creating those extra aspects myself since I did not have someone to animate them for me. I first started this process by creating a very simplistic 3D space in Maya that was a very rectilinear hall with two rows of columns. I then populated the space with two rectangular prisms that would act as stand-ins for the witches. To differentiate the two, I colored one red and the other blue as well as to help them stand out from the background since all polygons default as a light gray in Maya. I then did basic key animations of the rectangular prisms to have them move around the space in order to create the blocking for the witches in the scene. I also added animation to some spheres flying around the space to block out where the spells would be fired. I finished the Maya scene with some camera work to get certain angles I wanted the spells to be caught in. In the end. the scene is blocked as follows: The 1st (shot by the black witch) and 2nd spells (shot by the gray witch) are

thrown at the same time and clash as well as the 3rd (shot by the black witch) and 4th (shot by the gray witch) which combine and spirals away like a sawblade and saws through a pillar causing it to fall. The 5th spell is shot by the black witch towards the gray witch but the gray witch dodges and runs away towards another pillar. That spell ends up hitting the wall at the back of the hall and disappearing with a small burst. The 6th spell is shot again by the black witch towards the gray witch but the gray witch makes it behind the pillar and the 6th spell hits the pillar instead. It doesn't fall like the other pillar did but is left with big cracks. The gray witch then runs to another pillar and shoots the 7th spell at the black witch, hitting the black witch in the face causing her to fall and slide backwards on the floor. From the black witch's perspective on the floor, we look up towards the gray witch who holds the black witch at wandpoint with the 8th spell ready to fire if needed and thus ending the duel. I playblasted the Maya scene and then imported the resulting video into Toon Boom. Now that I had a base to work with, I started with tracing lines over the 3D space to create my background for the scene in a process similar to rotoscope animation in which one traces over live-action reference footage. I then colored the background a mid-tone gray. Once I finished that process, I moved on to drawing silhouettes of witches over the rectangular prisms I used as stand-ins for the witches. The reason I did silhouettes rather than true figures was to make the workload easier as well as be simple enough to be able to identify the witches as witches and to glean the context of the scene but not draw attention away from the FX animation which would be the focus of the short video. Although the referenced shapes for the witches were blue and red, I made the silhouettes of the witches black





and light gray. Another decision to keep the witches from standing out from the FX animation. Overall, any part of the video that was not FX animation would be in greyscale so the FX would be the main focus. After the background and witches were done, I could finally start the important part I was looking forward to: the FX. I wanted the 1st to be similar to a hot pink bolt of electricity and the 2nd spell to be like a wave of pale blue water. When they clashed, the spells



interacted with electric spells sparking around the water spell which then would be evaporated by the heat of the electricity and dissipate into mist. The 3rd spell was a wave of sparking magma and the 4th was a spiraling pale green and purple magic bolt. When the two clashed, they combined into a golden sawblade and flew away to saw a pillar in half. When the spell cut through the pillar, I had dust fly up two times: from the cut where the pillar sawed and when the top half of the pillar fell and hit the ground. The 5th spell shot at the gray witch who dodged was a fireball. The 6th spell shot at the gray witch but hit the pillar was a magic pink cannonball that exploded into mint green smoke. The 6th spell the gray witch shot at the black witch which caused them to fall was a purple ball of slime. The final spell that the gray witch held the black witch at wandpoint with was a bright blue fire.

Completing Demo Reel

After completing all of my projects, I had to compile them together into one video presentation to use as a professional Demo Reel. The initial process for this was fairly simple. I took each animation and exported a video to drop into the After Effects file. The videos became their own layer. I arranged each layer so that the videos would play one after another instead of all at once over each other. I also had to come up with a title card that would display my name

and my specialty. I wanted it to be unique and attention catching so I decided I would quite literally make it “flashy”. Despite the fact that time was running out to make my demo reel and turn it in, I made one last short animation to use for my name on the title card. Using experience

from my lightning FX test, I drew a purple lightning bolt flashing across the top half of the screen and leaving behind static electricity that then exploded and formed into my name. I had initially animated it on a black

background but like with my fireworks animation, decided it needed a more interesting context. I found an old drawing I did of a neon pink, blue, and purple cityscape and repurposed it to use for the title card. After putting it behind my name, I found that my name being purple blended into the background city. I kept the lightning purple but when the static electricity left behind exploded, I used the flash to transition my name to a light blue color that stood out better but didn’t contrast too much. I then added plain text saying “2D FX” in hot pink as a subtitle under my name. With the title card done, the last thing I had to do was find some royalty free music. I ended up finding a song called “Happy Rock” by Benjamin Tissot on Bensound.com. I put it into the After Effect file and played it back to find that the song's intro was just a little longer than I had initially made the title card. To make my demo reel seem more coordinated, I extended the duration of the title card just a bit to match the length of the intro so when the music changed, it changed when my first project appeared on the screen. With my demo reel done, I had just completed the main goal and final project for ART 490. I can now breathe easier knowing I am getting closer to my future dreams.