

3D Character Animation Demo Reel

An Honors Thesis (HONR 499)

by

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Abstract

This project outlines the process of creating a 3D character animation demo reel. My project consists of four pieces centered on themes exploring feature film animation: Emotion, Gag-Scare, Dance, and Suspense. With these themes, I hope to create quality storytelling animation and entertainment that will help me break into the animation industry. My demo reel features a personal selection of my best 3D work from the past year. This work includes video clips from my fall semester senior film "Frick."

Acknowledgements

I would like to thank Andy Beane for his constant guidance. He offered his eye for 3D animation and rendering to help me make a quality portfolio. His lectures on living as an animator, prioritizing values and commitments have given me a better position to being successful in my career. I will not forget the good teaching and mentorship he has provided me over the past three years in the animation school.

I would like to thank Brad Condie, Zachary Craw, and Brain Ludwick for the rich education of animation from the past three years.

I would like to thank my animation class mates, especially Dani Campbell, Mallory Creekmur, Jake Mosher, Melissa Taber, and Lyron Boyden for being supports to my animation process. Your advice pushed me to sharpen my animation skills and my professional work as a whole.

Thanks to Long Winter Studios for great rigs and customer service.

Process Analysis Statement

Introduction

When I was twelve, I used to watch cartoons every Saturday morning. I enjoyed shows such as Pokémon, Tom and Jerry, and Teen Titans. This interest in cartoons transformed over time into a hobby for drawing cartoons, writing my own stories, and eventually pursuing a major in animation. After three years, I have honed my skills in character animation to apply to animation studios in Las Angeles, California hoping to pursue a career in feature film.

Character animation is one of the many concentrations in animation that contribute to producing a film. This type of animation focuses on animating characters to move, dance, and communicate with other characters on a film. For 3D films such as Toy Story, a character animator would be in charge of animating all acting choices, dialogue, and action animation for a character such as Woody or Buzz Lightyear in a 3D animation program. I chose this path of animation, because of the unique creative vein of production it allows me to work in. As a 3D character animator, I get to bring the 3D characters to life. In order to get into this profession, I have to create convincing animation compiled in a demo reel to be presented to studios as my portfolio.

This past semester I composed a one minute character animation demo reel. A demo reel is one to two minutes in length and features the work an animator has accomplished. From my interest in film, I focused on creating pieces for a demo reel portfolio centered on a career in 3D character animation. This senior thesis project demanded me to create my own production timeline, list goals for what I would create and mark where my regular critiques would be. Critiques is a term meaning critical feedback from my professor and peers on the planning, artwork, and animation I create. My project consists of four pieces centered on themes exploring feature film animation: Emotion, Gag-Scare, Dance, and Suspense. With these themes, I hope to create quality storytelling animation and entertainment that will help me break into the animation industry. At the end of the semester, I compiled my animations together into a

cohesive demo reel and pondered how I would present a paper over the four months' work it took create it. The following will touch on the process of making my portfolio pieces and share an analysis of my thoughts and feelings over my final demo reel. I encourage whoever reads this to sit back, relax, and grab a snack or beverage to enjoy while you read and watch my demo reel.

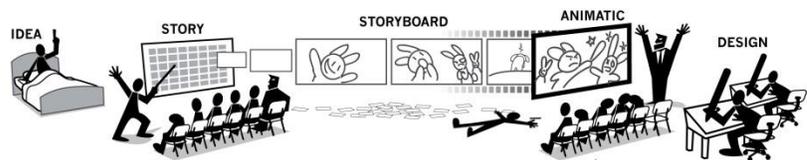
The Structure

¹Watching cartoons as a kid was fun, but I never knew how intricate and complicated the animation process was until I seriously studied animation. A film usually has a major production pipeline with various different teams working to create the final animated piece. Below is a graphic showing the pre-production, production and post-production teams of a 3D animated production pipe-line.

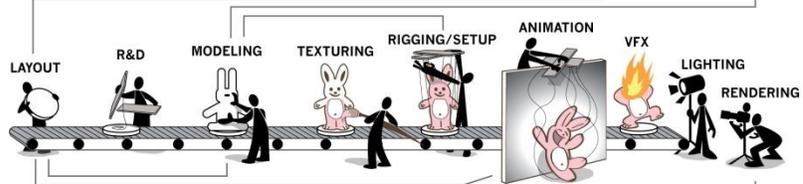
The character animation team is part of the final steps of production pipeline. To achieve a film like Toy Story, a lot goes into just the character animation. For my demo reel, I used six stages to creating a finished character animation: storyboarding (if working on an independent piece), reference, block-in animation, rough animation, final animation, and clean up. I also subscribed to Long Winter Studios and used characters from their website.

3D Production Pipeline

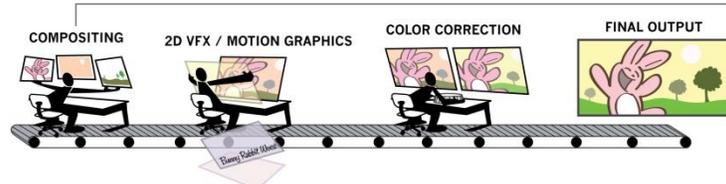
PRE-PRODUCTION



PRODUCTION



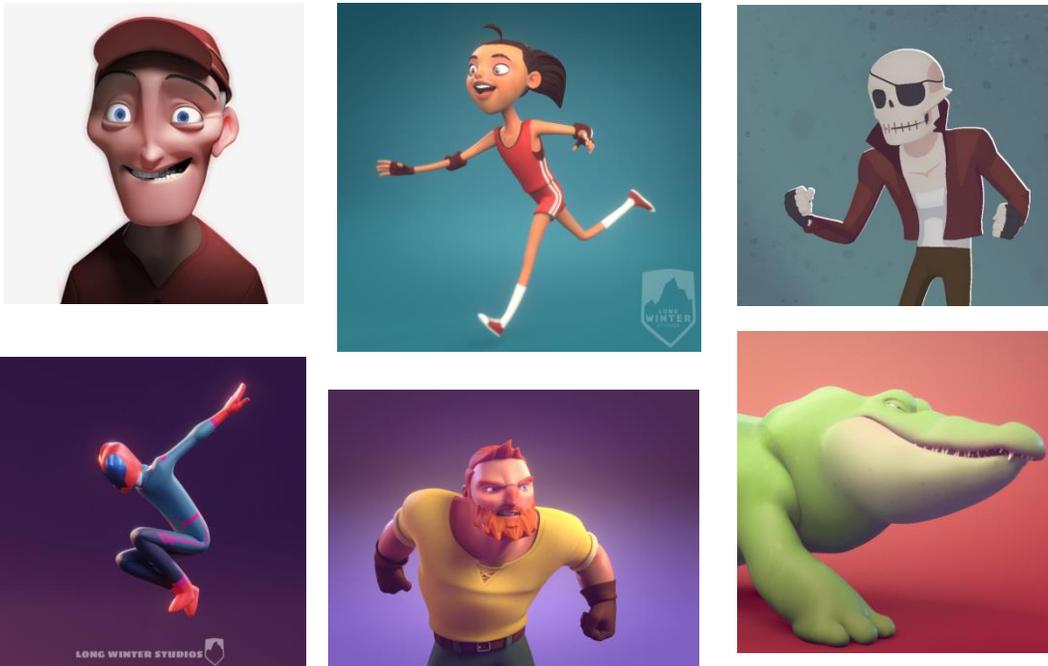
POST-PRODUCTION



¹ This 3D Production Pipeline was presented to us by Andy Beane during our Senior Thesis Film "Frick" and helped us create a film with all its features in 16 weeks. Some of my character animation from Frick is featured in the final demo reel piece.

These characters or *character rigs* are 3D characters that have controllers on their form that allows animators to manipulate them like a puppet to create character animations.

Below feature the six Long Winter Animation character rigs I used for my animations: “Walter”, “Taylor”, “Grimm” (Top Row Left to Right), “Fast”, “Paul”, and “Dale the Crocodile” (Bottom Row Left to Right).



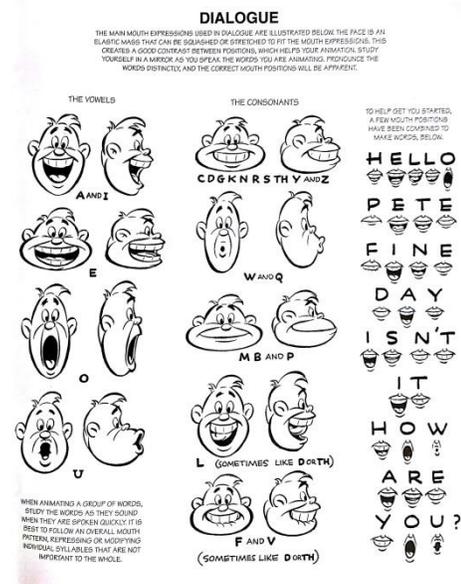
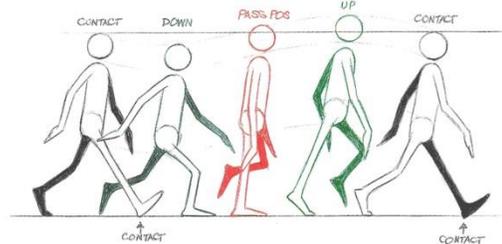
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Starting the storyboarding stage, an animator has to compose an entertaining piece to create reference from and then animate. Thankfully, I had set the four themes: Emotions, Gag Scare, Dance and Suspense, to make a story board from. A story board is a series of sequential drawings that convey a plot or thought. With my prompts, I made ideations on sketchbook paper of made story ideas. I would draw out scenes of emotions, design gag scare takes, and ponder how to create suspense in less than ten seconds of animation. I asked myself many questions throughout this process: could convey this idea through a few seconds of animation, would it

² These are character rigs from Long Winter Studios: “Walter” was used for the Emotion theme, “Taylor” and “Grimm” were used for the Gag Scare, “Fast” for the Dance, and “Paul” and “Dale the Crocodile” for the final Suspense theme. These characters and the themed pieces will be expounded on later in the paper.

make sense to audience, and would this entertain and elicit an emotional reaction from the audience having seen what I made. If the idea did not excite me, make me laugh, or challenge me, then I would scrap the story and move on. This stage ends up being a rapid stage of picking characters to use and brainstorming what props they would have to interact with. After choosing the character from Long Winter Studios I would use, I would start creating stories boards based off of those characters to the prompted themes I had chosen.

³The reference stage comes after solidifying the story board process. There are two different ways to tackle reference for character animation. First of all, reference means footage of someone acting out a scene as the character to be animated for a more accurate animation or footage used to help make an animation accurate. The two methods are creating homemade live reference footage and the second is finding online footage. To create my own homemade footage, I had to have my classmate record me acting out my scene. Using online footage from YouTube or from shows is the second method of finding reference for an animation. In every case for my



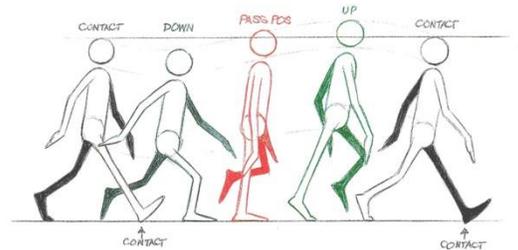
animations, reference was a pivotal part of incorporating the twelve principles of animation into my piece. I used both methods of reference for almost all of my pieces and can see the difference in quality from when I neglected to use any. Using animation timing charts are also considered very useful reference since they give timing on basic actions such as a run cycle; walk cycle, phonetic lip shape chart, or other resources that could help bolster an animation. An animation cycle is a repeated action that can be created with a tried and true formula. For

³ The walk cycle was illustration is by Richard Williams and the phoneme chart is by Preston Blair.

example, a walk cycle as seen on the depicted to the previous page and a dialogue chart for creating mouth sounds.

Now that these first few stages are out of the way, it is time to start animating. To begin 3D animating, this process, I have to set my scene in Autodesk Maya software or Maya for short. The definition to Maya's software and some of the following vocab in this technical explanation of 3D animation are listed in the Animation Lingo section at the end of the paper. I

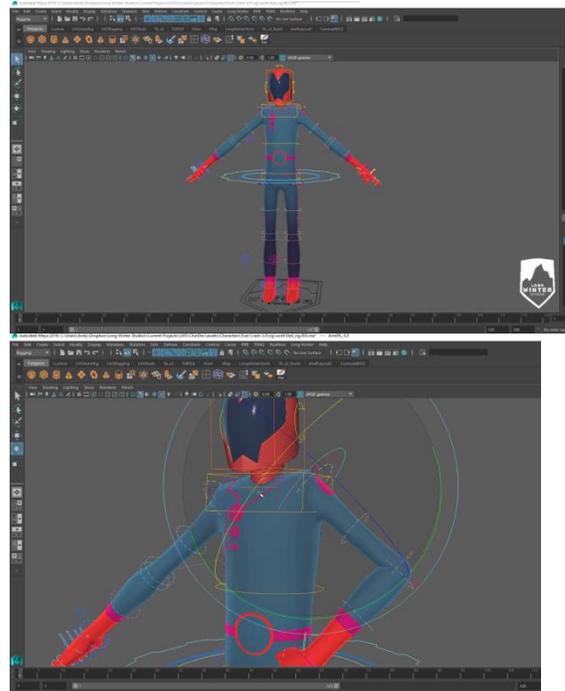
create a project in the program that will act as my saving folder for all renditions of my scenes, and then reference in the character I wish to use. Referencing a character rig is



done by pulling a character rig through a network of files into a scene that is desired. With the character rig in place, I then need to explain some animation vocab. To animate anything, I will use the walk cycle example from earlier to illustrate the following vocabulary: keys, setting keys, and key poses. A key is any general pose seen above, contact, down, passing position of the walk, the up, and then contact position. Key poses are the main poses needed to make up an animated action. For the walk that would be the contact and the up pose above as key poses. To set a key in Maya, I must move a character rigs controller (a tool used to move a body part like a puppet) and then press "s" on my key board to set a key, or the first position. Then I would move down the timeline, a little ruler that displays the frame I am animating on, to another frame and move the same controller again, press "s" to set the next key. If I play the animation, the keyed body part moves from the first keyed position to the next. This is the basics to animating a character. If that was just the hand that I animated, there are over a eighty different controllers for one character rig to manipulate, meaning setting keys and animating a character can get very complicated.

The following lists a short description of controllers. Each character has a set of controllers that allow an animator to key the character in different positions for an animation.

The controllers can be selected with a mouse and alternate between a scaling, move tool, and rotation feature. Scaling increases the size of an object, the move tool moves an object, and the rotation tool rotates it. For a character animator, character rig controllers are most often only operated from the rotation feature, otherwise it would break the rigs shoulder. The move tool is only used for the hip controllers to move the main



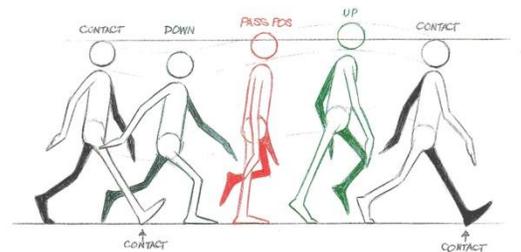
torso of the character through space, for exaggeration of a pose, or when using hands or feet in IK (Inverse Kinematics) format. There are two animation types, IK and FK animation in 3D. IK animation is Inverse Kinematics and keeps the hands or feet stable in position when manipulating the main body of the figure around a scene. This type of animation is useful when needing to place a hand on a stationary object, leaning against a wall or when doing a dance animation for fancy foot work. FK or forward kinematics is animation that works from the shoulder or hip outward, with all the moving energy coming from the figure out. FK animation is useful for actions that need nice clean arcs, which are heavily desired in animation, and animating walk cycles and runs. The picture of “Fast” character rig above is set to FK and the shoulder controller is selected and rotated in the picture below his standard A-Frame pose. An A-frame pose for a character rig is the basic starting position for a character before they are to be posed for animation. Switching between IK and FK animation effects an animations feel and makes animating more effective and believable.

With that detailed, along with my reference, I am ready to move on to the third stage of animation, Block In Animation. This step’s main focus is to block in the main poses of the animation with little detail work. Block in animation helps to see how much space a character will cover with an action such as a dance, run, jump, or fall. A block in animation is done with the

timeline settings set to stepped animation. Stepped animation is a term explained in the Animation lingo section of this paper. The key poses are the main poses that create the main emotion for the scene. By moving the rigs controllers and pressing “s” to key the animation, I get to figure out the format I want for my future animation. With the key poses in place, I am ready for the next stage, rough animation.

Rough animation is animation that pushes the key poses further with more secondary animation, and adds in-betweens. Inbetweens are poses that are placed in between key poses to help communicate the action. For the walking animation, the in-betweens are the down and up points of the walk as seen to the right. Adding in-betweens helps smooth out the animation. I would switch between stepped preview and

regular preview modes to see both the snap shot of my keyed poses and the interpellation the computer generates between keyed frames. Inbetweens are keyed just like key



poses. Another tool that comes into play is the graph editor. It displays animation curves that display the smoothness of the animation. If the animation curves are not making smooth arcs, then it is a signal that some part of the animation is not moving as naturally as possible.

Final Animation is the next stage of animation. This pushes the animation to its farthest point. The twelve principles of animation, detailed in animation lingo at the end of this document, should be visible by this point. Particularly, I look for secondary action and follow through specifically and push my details until the animation comes alive and develops its own personality.

The final stage is called the Cleanup stage, because the animation must be refined and cut down some to make it the best it can be. To achieve cleanup, I use the graph editor to check on the curves and make sure all controllers are keyed on the rig. Then I select all the curves, set them to weighted tangents, then Euler filter and play the animation. Weighted

tangents give each key more weight and allow a little more slow in and slow out for moving through the key poses along the animation curves. Euler filter shortens travel distance for IK controller movements. Slow in and slow out are animation terms detailed in the animation lingo section of the paper. After this, I delete segments of the animation that are not needed and this lets the curves have more fluidity. After this I check the arcs of my curves for any jagged edges and check for any popping or unsightly parts of my animation in the viewport window, the area I can view my animation. Sometimes, I find the need to reanimate a section and have to delete keys and restart from the rough stage. All these stages make up the labor of love which is character animation.

The Four Animation Themes

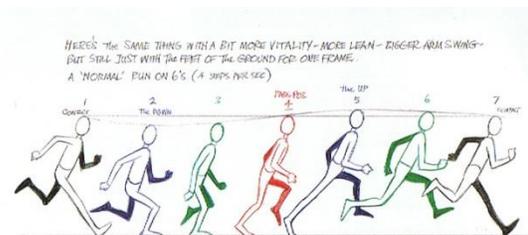
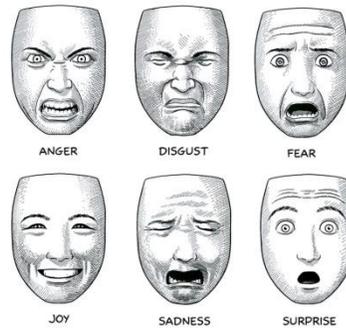
From my production timeline, I made it a goal to make a ten second animation for each month based off a different theme pertaining to feature film animation. These themes were: Emotions, Gag Scare, Dance Animation, and Suspense. The following will discuss my thoughts on creating each theme.

Emotions



For Emotions, I started by looking for dialogue with emotive qualities. I settled on using the “Walter” character rig after choosing a sound clip from King of the Hill. The sound clip is of Dale Gribble saying, “For three years I’ve had show-turtles, and I’ve never once put them in a show. I’m a freaking hypocrite.” Something about this dialogue was quirky and amused me very much, so I chose to use it. I then created my own reference from acting out the dialogue and dejection and had my classmate record me. This was an excellent first project since it allowed me to practice dialogue, movement, and was a simple animation to refresh my mind on animation and help me to begin to understand Long Winter Studios Rig controls. One step of animation that was supposed to be done first was the lip animation for the words, but I chose to do that after I animated “Walter” rigs’ body. I followed the phoneme chart and set separate keys to create the mouth animation. For the body, I followed the animation stages I detailed above.⁴ Walter was animated in FK for his arms, his torso and legs were set to IK. The whole process took me one month for the ten seconds of animation.

SIX BASIC EXPRESSIONS



Gag Scare⁵

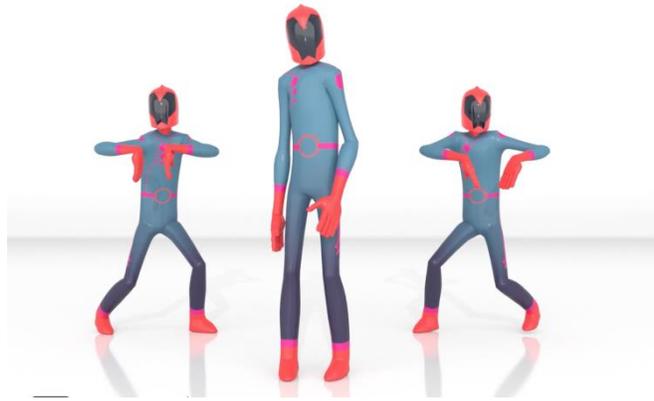
The Gag Scare theme was inspired by an interest in animation from Sony’s *Hotel Transylvania*. In particular, I enjoyed the exaggerated movements and cartoony feel the monsters and humans displayed in the film. The film’s main

⁴ This is my theme of emotions. The Walter rig above is animated with basic props.

⁵ This is my Gag Scare. Taylor left is being scared by Grimm right.

character, Johnny, gets scared by one of the monsters in the hotel and then launches into a series of comedic runs and terrified screams. I hoped to capture that energy and comedy for myself.

I spoke about cycles before, and below is the one I used to figure out the “Taylor” character rig’s main run. Taylors arms were set to FK and then transitioned to IK when she landed from her fall. He legs were set to IK. Grimm was animated Torso and Legs in IK, and arms in FK. This pattern continues for the Dance as well.



For the gag scare, I knew the cartoony run Johnny displayed was something I would want to reference along with a run chart that would allow me to accurately animate my character running. I took the “Taylor” character rig left, and the Grimm character “Rig” right and composed a scene where Grimm would scare Taylor. I followed the main animation structure and finished this piece after two months of work. In my growth reflection, I detail some issues I had when not using reference to animate a faint for “Taylor” character rig and thus caused me to cut down my animation size. This video animation is three seconds in length.

Dance⁶

The Dance theme was created over two months’ time to create and is based off choreography of half•alive- Still Feel [VIDEO]. The story-boarding stage was skipped, since my reference and story resided in copying the video’s dance movements. I used the character rig called “Fast” from Long Winter Studios. The Block-In Stage took the most time, since for a

⁶ This is my dance animation using the three Fast rigs. Each of them were animated independently.

dance animation; I had to key every three frames for a pose. This is to get the most accurate movement of the dance, its arcs, and overlapping action of the different body parts. The definition to arcs and overlapping action can be found in the animation lingo section at the base of the document.



With dance as my personal hobby, I was excited to take on the challenge of a dance animation. From the Block-In Stage, I cut down my five hundred frame animation goal to two hundred and fifty. The choreography from 0:23-0:33, about 11 seconds of dancing, was recreated using three duplicates of the “Fast” character rig. I animated and finessed each one from Block-In stage, to rough animation, to final animation, and finally to clean-up. A daunting amount of time was placed into this animation, and I receive one critique over its contents. I worked to make the movement a little more natural and smoother. I was satisfied with my final product in the end.

Suspense⁷

For the Suspense theme, I started by story-boarding some suspenseful scenes. Of them I settled on a man dangling precariously over crocodile infested waters. This animation was created from the Paul and Dale the crocodile rigs. I followed the final stages of animation detailed above and completed this piece in under a week. I used reference of Captain Hook from Disney’s *Peter Pan* to create this animation. Captain Hook’s fear and him dangling over the crocodile were both inspirations that drove this piece. I also used live footage from YouTube of crocodiles jumping and snapping at bait as reference. This piece has been the most telling of my growth as an animator and it is the one I am most proud of. This animation was the crocodile

⁷ This animation is of Paul above being almost bitten by Dale the crocodile below. Look closely to see the waves light reflecting off of the characters that were added after the completed animation through render magic.

animated in IK and Paul completely in IK as well since he needed his hands to hold on to the rope.

I am pleased with the story-quality and the feeling of comedy and concern it generates from watching it. In the end, I worked with Andy Beane to render a light that refracts like water from underneath the two characters. This creates the illusion of deep water and adds to the story of this piece. I was so pleased with how this turned out that I utilized it as an opening piece for my demo reel.



Character Animations from “Frick”

The final half of my demo reel contains collaborative animation from “Frick.” Every clip followed the production pipeline to make the final animation. I worked in every stage of animation with a team of character animators.⁸

The Final Demo Reel

After finishing all the animations, I took a few extra steps to make the highest quality reel as possible. For all my animations, I added lighting, re-textured the character rigs and then rendered every scene. Essentially rendering is the finalized sequential high quality photos of an animation ready to be compiled into a video editing software such as Adobe After Effects or Adobe Premiere. Texturing and lighting took about 15 hours to finish and rendering all the videos 17 hours.

After rendering, I took the .tif sequential files and plugged them into Adobe After Effects, a motion graphics and video editing software, to export them as their own video files through Adobe Media Encoder, a video processing software. With the videos processed, I developed a

⁸ This image is from Frick, I animated the Cat and the Dog. Here she is looking through the window blinds. The blinds took a lot to animate them properly and I had to create my own reference.

title with my name, icons listing the animation programs I am proficient in and email, as well as a end title frame with my social media handle for my art pages @ohlivyloohoo. With a title, end title, the videos from my four themes, and video clips of character animation from Frick, I organized and compiled them into After Effects as one animation demo reel. I added music, adjusted timing, and then processed it through Adobe Media Encoder as my final demo reel My exported the video file is 1920X1080 format Vimeo 1080 HD quality viewable on my own Art Station portfolio page, Twitter, Vimeo, and soon to be YouTube channel. This final process of adding my best animations together and publishing them took over eight hours to complete.⁹

The Growth

This project has pushed me emotionally, physically, mentally and spiritually. At gained a better understanding of myself and my interests in animation over the last few months than in the past few years of my animation classes. The hardest part of animating for me was being content with the level of animation I was at compared to the ideas I had brewing inside my head. To put this in perspective, I originally wanted to do twenty seconds of animation per month. After my first month on the Emotion theme I ended up dividing myself between working on the Show Turtle Animation and another animation of a boy riding a dinosaur, I soon found I could barely get through one ten second animation in that span of time. I had to scrap the dinosaur animation and hyper focus in on the show turtle animation. My multitude of ideas and the amount of animation I could get done in a timely manner limited me to ten seconds of animation a month.

I also had to accept trimming back animation that just ended up looking bad. For my Gag Scare, I had originally worked on at least one hundred and eighty frames of animation. After a failed fainting animation, I cut out the final ninety-five frames and only ended up using three seconds of the animation that appears in my demo reel. This poor animation was due to my neglect of finding or creating reference for the girl's faint. In terms of time, I would have not wasted as much if I had acted out a faint for my animation.

⁹ Another Scene from Frick that I really enjoyed. The Dog sitting down to have some breakfast.

From my Dance animation, I found the formulaic copying of a dance to be very boring, but beneficial to understanding movement in a dance animation. I grew in the principles of animation of arcs, secondary action, and timing. These principles are defined in the Animation Lingo section at the end of the document.



Finally my Suspense animation gave me more confidence in my animation skills. I truly thought I was not going to finish this final animation since I only had one week left to finish it. My Dance and Gag scare animation both pushed my production timeline back and I was already drained by the work I had done. When I pushed myself to focus on the storyboard I had created and used lots of reference of crocodiles and Captain Hook, I saw all the animation principles coming together. It was exciting to see my growth and I look forward to becoming even better.

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Conclusion

Overall, I view my demo reel as a successful step towards my career as a character animator. I have bettered my skills through constant hours of following my own outline of creating unique character animation, and I am better prepared to make work to expand my portfolio after graduating Ball State. My plan is to continue creating work into my career and onward. To be part of the animation production pipeline, I must hone myself to be a focused talented character animator. This takes practice, life observation, film study, and critique from professionals. I know from my senior thesis project, I have a solid foundation to show I am striving to create industry standard artwork. I am certain my demo reel will be transformed over

¹⁰ An intense scene from Frick where the Cat is so angry, she breaks her neighbor's lawn flamingo.

the coming years with new projects, experiences, and observations. I am excited to return the gift of animation to those who love watching cartoons and animated features. I have been contemplating how much time I devote to make such a small amount of animation, but I find myself not discouraged. I look forward to creating as part of a team again for a greater cause, to make a film. Perhaps someday, someone watching that film I hope to work on will develop a hobby for drawing, writing their own stories and ends up in the same industry I hope to be in. For now, I will continue creating and working towards bettering myself as an artist.

Animation Lingo

24 FPS: 24 frames per second. Each animated feature is set to 24 frames per second. This is an industry standard. It can take 24 drawings (2D animation), or rendered images (3D animation) to create one second of animation.

3D: three-dimensional. In animation, to work in 3D, animators create computer generated 3D objects and manipulate them to props, character models, environments, and animations.

Adobe After Effects: motion graphics software that can be used to composite multimedia.

Adobe Premiere: Video editing software used to compile footage.

Animation curves: The animation's 2D curves on the graph editor showing the smoothness and flow of different aspects of animation.

Anticipation: Prepares the viewer for what will happen next.

Appeal: How attractive or likeable the character looks or acts.

Arc: The path a character's hands, head, feet, tail or other features make that create an arc.

Art Station: A website used by artists as a free online art portfolio.

Autodesk Maya: 3D software that allows users to model, texture, light, and animate environments, characters, and scenes.

Blocking Animation: The main poses of animation viewed on Stepped Preview/stepped animation.

Character Animator: an animator focusing on manipulating a character to create believable acting animation. Ex. *Toy Story's* Woody walk, run, dialogue, and facial expressions.

Cleanup Animation: The stage after final animation that trims off unnecessary animation keys and re-emphasizes key animation poses for greater believability.

Demo reel: a one to two-minute piece featuring the work a digital artist has created.

Exaggeration: Pushing an action to be more exaggerated for better emotive effect.

Final Animation: The stage after rough animation that pushes its animation to its limit and could be considered finished.

Frame: A single frame is equal to one drawing or one rendered image of animation.

Graph Editor: The animation tool used to clean up animation curves, timing, and make a smoother animation.

Hard work: making a piece that took many sleepless hours to create and then is consumed by the public in seconds then repeating the process. This is fueled usually by drinking lots and lots of coffee.

Inbetweens: The poses that are in between the main key poses that help smoothly translate a moving action.

Key frames/ Key poses: The main poses necessary to convey a desired theatrical performance.

Keys: The general term to indicate poses created for the character that makes up an animation.

Lighting: The way a scene is lit to show a mood and illuminate the characters present.

Long Winter Studios: A studio that has a variety of rigs for animators to use.

Overlap/Follow Through: Overlapping actions are actions that occur at varied times and therefore must be animated independently, a character jumping and the hair moving after.

Follow through animation is a moving part of a character that continues moving through the current action even after the character has stopped, the hair settling after the character has landed from the jump.

Playblast: A rough Quick Time video exported from Maya's software.

Portfolio: A set of personal art created to be shown to a prospective employer. For character animators, a website displaying current 2D or 3D animations is sufficient to send in a job application. Social Media such as Twitter and Instagram can also be used as portfolio boosters when work is published there and the animator accrues lots of followers.

Reference: live footage of a person acting out a scene or online footage to achieve an animation's timing.

Rendering: The final image sequence of an animation with full lighting, texturing, and finished animation.

Rigs: 3D modeled characters that can be animated.

Rough Animation: The stage after blocking where animation is taken off of stepped animation and in-betweens are added between poses. Animation would run real-time.

Secondary Action: Subtle actions that are accentuated by another part of the character moving.

Ex. The way a character fingers curl when they yell.

Slow in & Slow Out: slow in is starting an action fast and in the end slowing down. Slow out is starting an action slow and ending fast.

Solid Drawing: Not necessary in 3D, but 2D animation drawing a character over and over maintaining consistency in quality and form.

Squash & Stretch: an action of stretching a character or squashing them to accentuate action.

Staging: sets the stage to identify the most important action or event in the scene.

Stepped Preview/Stepped Animation: Animation that moves from pose to pose without interpolation.

Storyboarding: Sequential images in a quick hand drawn form to convey plot. Helps set the scenes for acting and animating.

Straight ahead action/ Pose to Pose: Straight ahead action is animation done frame by frame, pose to pose animation in 3D is used by creating main poses first and then poses in between.

The Twelve Principles of Animation: Anticipation, Staging, Straight ahead action/Pose to Pose, Slow in & Slow Out, Appeal, Timing, Arc, Solid Drawing, Overlap/Follow Through, Secondary Action, and Exaggeration are used to make believable and entertaining animation.

Timing: The amount of time an action takes to occur in an animation.

Vimeo: A website for posting film media. It is used by 3D animators to post demo reels.

Documentation of Sources

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