# the Art of Motion

*an exploration of the art and science of animation*

## goal

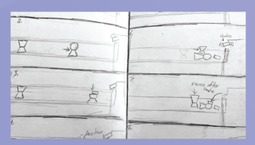
Animation is an integral part of our daily lives. From entertainment, to advertisements, to medical visualizations and everything in between, it permeates our world. But what makes animation so compelling? Why do we connect with it so well? And what makes it visually appealing?

Humans are story driven creatures, and so we gravitate towards time-based media—it's the perfect vehicle for telling stories. Our goal was to explore the variety of styles and tools used in animation, research the 12 principles, understand the process of creating a work from start to finish, and successfully demonstrate the science and art of animation.

## process

In a sense, animation is the art of illusion. Frames (whether digital or physical) are played quick enough that our eyes experience ***"persistence of vision."*** This is what makes the images appear to move. To understand how to make this movement look good, we researched the ***12 principles*** of animation and chose six of the more visual ones to demonstrate. We decided to create six animations, each showcasing a different principle. Because animation can transcend the need for words, each animation features a different location from around the globe—movement is a universal language.

To highlight the importance of the principles of animation, we created two characters, Max and Nerio. In each animation, one character utilizes the principle, whereas the other does not.



The characters were kept simple in design so we could focus on the animation itself. Character turnaround sheets ensured our characters looked consistent across the different styles.

For each animation, we created a ***storyboard*** first, which outlines the actions in simple drawings. Then, we proceeded to learn the unique tools of the style we worked in. We started with more traditional/early forms of animation and worked our way up to more complex forms. After finishing the animation itself, we added sound design and did final post-processing before exporting. Each style provided unique challenges for us to troubleshoot, and so, the quality of our animation improved with each one.

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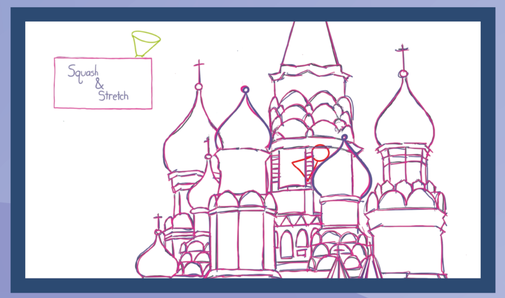



**Traditional - Squash & Stretch - Russia**

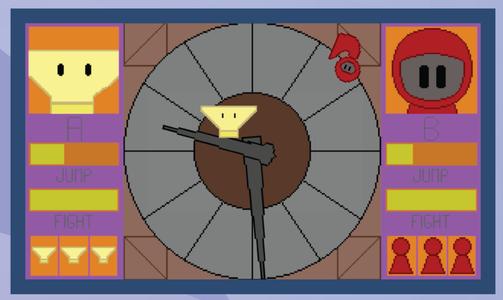
In this style, each frame is drawn out by hand. It is unique because there is no software filling in between each keyframe, therefore, every frame has to be drawn out. This provides a challenge as you have to focus on keeping everything consistent (i.e. character size) and figure out what all of the in-betweens look like.


**Stop Motion - Anticipation - The Great Wall**

In this style, physical props/puppets are moved around and a photo is taken for each frame. In papercut stopmo specifically, paper cutouts are made. While other forms of animation rely heavily on computers, this type of animation is very hands-on. The biggest challenge was moving tiny pieces of paper without moving ones that aren't meant to be moved.


**2D/Vector - Ease In, Ease Out - Pyramids of Giza**

In this style, assets are moved by placing keyframes and the computer calculates the in-betweens. This allows for a quick workflow and easy experimentation. The vector-based software also had a variety of tools to add fun details to the animation such as particle simulations, character bends, and the moon explosion; effects that would be hard to achieve traditionally.

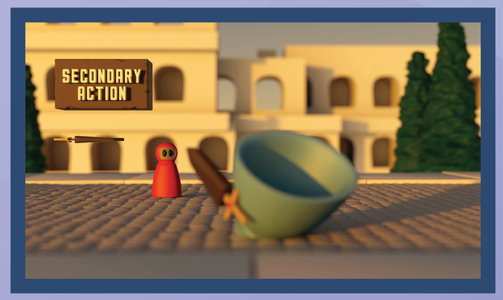



**Pixel - Arcs - Big Ben**

In this style, a combination of frame-by-frame and keyframe based softwares are used. The style proved challenging as we had to really simplify designs to translate into a pixel grid. Key actions were animated by hand, and then software was used to time spatial movements.


**Experimental - Exaggeration - Danxia Landform**

In this style, typical animation conventions are thrown to the wayside—mostly. Experimental animation is all about focusing on unique, unconventional ways of making. While animation always has creative potential, this style has even more as the goal is to move away from animation traditions and embrace individuality and self-expression.




**3D - Secondary Action - The Colosseum**

In this style, expansive 3D software is used to model, animate, and render animation. The challenge in this one was learning how to model in 3D. We barely scratched the surface, yet there was so much we had to learn. Other aspects such as lighting weren't present in other animation styles but needed to be considered in 3D.

## results

Focusing on the individual principles of animation allowed us to gain deeper knowledge of each one and animation as a whole. Exploring a variety of techniques and softwares provided us with knowledge and practical skills to use in the industry. Along the way, there were several surprises, the biggest one being the importance of sound design—it truly can transform animated content.

After completing these six animations, we realized just how much work goes into animation, from planning, to learning new tools, to observation, to execution. This research gave us a great foundation and we can continue to build upon these skills to create more complex animation in the future.

"My favorite style was either pixel or 3D. They both taught me skills I can use in the videogame industry. The one that challenged me the most was experimental as not everything I tried worked, but I learned that by taking a risk with the style I can find parts of it I love even if not all of it works out as planned."

– AUDREY

"Drawing for traditional animation was the most challenging when showing squash and stretch. All the work did help me get better at drawing. 3D animation is my favorite."

– SELINA

*A project by:*

Audrey Caleb & Selina Shang

*Assisted by Thomas Giebler // Department of Art & Design*

FORT HAYS STATE UNIVERSITY
THE SCHOOL OF VISUAL AND PERFORMING ARTS