Computer Animation stage 2

My first stage of this assignment I believe was not done to my best ability, whether that may be because I was lacking time due to other courses, or due to personal circumstances, or due to the fact I forgot to submit my reference page… is all irrelevant, as I am determined to perform the second stage to my best ability, even with other factors still at hand.

To start off, I would like to state my intended goal for this project. The goal is to create a menu with interactive pieces that makes proper use of the principals of animation and proper animation techniques, as well as an interactive scene where the user can trigger interactions. I plan to achieve this goal by using a myriad of animation techniques discussed and practiced in this course, and some that may have been discussed in theory, but not in practice. This includes but is not limited to:

- The use of FK and IK
- Humanoid and arthropodal characters
- Appropriate use of the principles of animation
- Third person camera movement
- Character rigging
- Catmull-rom path tool
- Finite state machines in the animator
- Custom scripts to control the enemy using Ik, and to control the player using pose to pose blending

The first area I will draw your attention to is the presence of a much lacking reference board, that I forgot to add in my first stage. With its presence now, I can fill in the missing context of the first project, and improve upon it with a new and improved reference board.

New Reference presentation:https://miro.com/app/board/uXjVL7ZXKeA=/?share_link_id=610547276164&shareablePresentation=1

Old Reference presentation:https://miro.com/app/board/uXjVLbOItuc=/?share_link_id=461967159781&shareablePresentation=1

Revisiting original impressions

My first Miro board shows how I planned to achieve certain goals previously, my new one will show the changes in my thought process and goals given the new information I have learned and new references I have gathered.

My new miro board improves on the things that I did not go fully in depth about into, and adds new information based on the changes I made from the first presentation. I introduced a new reference based on the game Createrria, which uses a simple but effective UI set up that shares

similarity with almost all my other references. My Character reference now features a more accurate and direct reference to what I based the animation system off, and a reference for how I implemented it in-engine. The most substantial change is the change in design of my enemy from a humanesque monster to a spider, to allow me to test and implement a simple ik leg placement script.

The Createrra UI animations piqued my interest because it balances simplicity and effectiveness, ensuring the player's attention is captured without overwhelming the interface.

The procedural movement system showcases how physics and procedural elements can make animations feel alive and organic, offering flexibility and reducing manual work in creating specific movements, allowing me to test and replace animations on the fly quickly, and make important adjustments when needed. Using this in unison with unity's blendspace would allow for even more possibilities, this is something that I would have loved to explore further with more time, but I will explore on my own time later.

Animation principles

The principles of animation readily employed in my references include:

Anticipation: Flashing/Color change and resizing in the UI prepares players for interaction by drawing attention to selected elements.

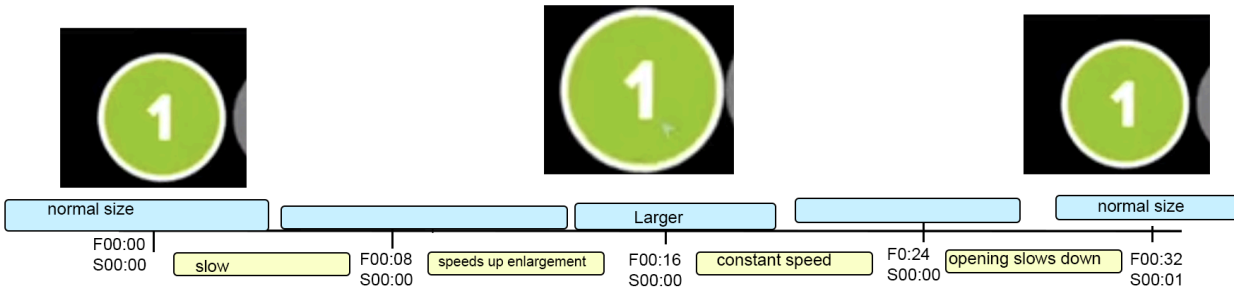
Timing and Spacing: The procedural animations use smooth timing through the use of LERP to create realistic object movement. This ensures that transitions feel fluid rather than abrupt, and allows for another principle.

Overshoot/Exaggeration: The procedural animations use the lerp or catmull-rom interpolation and tilting when acceleration and deceleration to imitate overshooting and exaggerating movements for the character. The UI's shrinking and enlarging then moving back into place is another example of exaggeration.

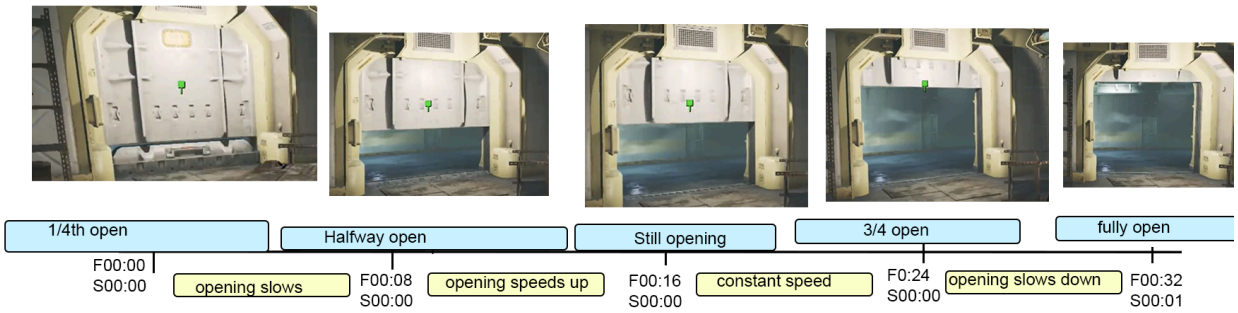
Pose to Pose: The procedural character animation makes a very practical and direct use of pose to pose, literally going from one pose to another to make a full on animation. This makes it easier to manipulate the animations in the engine and control how it links up with movement.

Timing Charts

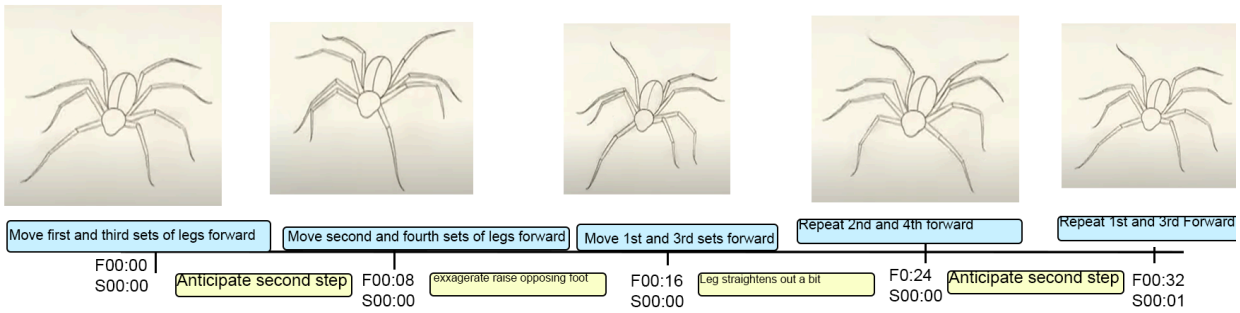
For my timing charts, I decided to create charts for my main references for each one, the first being the UI, and for its main reference, I chose the state of zen game



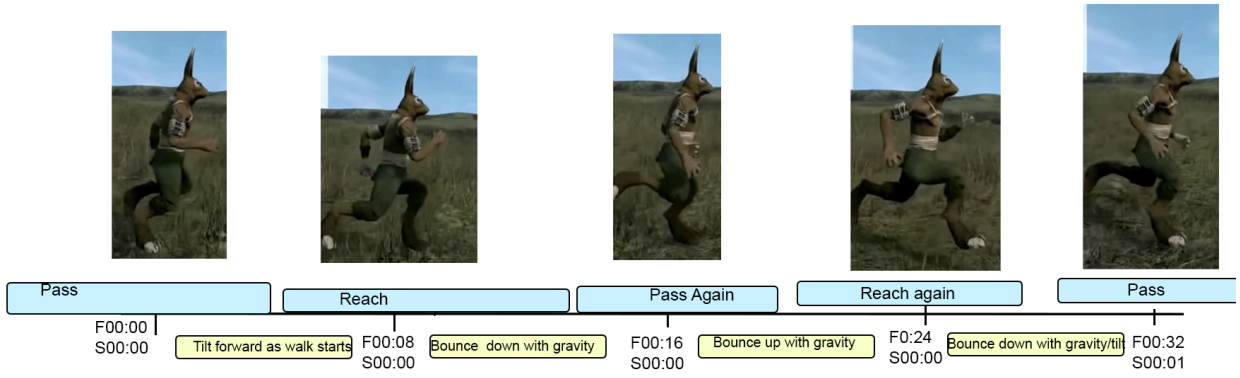
when the button is clicked it simply enlarges and returns to the normal size, to indicate that an interaction with that key has occurred, the same is true for the solitaire game, while for Createrria and Fallout, as shown in the references, utilize a quick change in color to show active or inactive UI. The animation makes use of easing in/out to make the transition from large to small smooth, so the player is not appalled by it, but recognizes the motion. This is also an effective and important visual cue used to determine whether a change has been made to the UI.



The motion of the door from closed to open is simply performed using easing in/out as well to simulate real movement of a door, and to give a smooth and recognizable movement to the door.



For the spider, as I discussed in the reference page, the feet move in sets the first, second, third and fourth sets of legs all move like a normal pair of legs, but they move in counter to each other kind of like a zigzag motion the first and third move in the same directions, and the second and fourth move in the same directions, this helps make the animation look very similar to the actual motion of a spider walking. It's also kinda unsettling. The secondary motion moves also like normal legs with the one step setting up the next, making the anticipation let you know what leg will be put down next, the exaggerated raising of the next foot to indicate that it is the next one that will be placed down.



The character animation uses pose to pose within the engine by blending from one pose to the next using linear interpolation, or in the case of the video, eventually bicubic interpolation in the video, but for my purposes I focused on the LERP implementation. The secondary movements are made using the physics, the character tilts forward when the character begins accelerating,

and then backwards during deceleration. My own implementation does not specifically use the physics for the movement.

Core Animation Concepts

LERP
Lerp is used at many points during the animation, for moving the character in the pose to pose system, and to move the character from point A to point B, as well as the spider. The lerp is also used for the Ik movement for the spider, lerping the leg one by one from its current position to the middle position and the target position.

Paths
The spider lerps from one point on a path to another in a circle of paths, using a catmull-rom script I made, by adjusting the pathmanager from the labs to create the catmull-rom script. It uses the calculation from the catmull-rom polynomial formula to calculate the path from each point to the next.

IK
IK is also used, as the movement of the spider uses IK to move the legs up on the spider, as the target position is changed the end bone moves to that location and affects the bones connected to it.
IK is also used in my reference for the third person character controller to make the aiming possible

Blending
Blending is used to control the movement of the character, as the pose to pose animation is based on the game's proprietary engine's blending from one pose to another to make the animations possible. Blending I used in the third person character controller to make the multidirectional strafing possible, blending the transition from one pose to another.

Usability and Engagement:

Enhance: The animations draw attention to important elements or provide satisfying visual feedback. The procedural nature of the animations make it easier to manipulate and control for both artists and designers.
Distract: If the animations were overly complex or too frequent, it would distract from the main goal of the gameplay or the UI. The same goes for the animation of the character and the spider, using the procedural system makes it less distracting and more focused on the goal at hand, reaching from one point to another.

Technical Considerations

For the character the transition from walking to a stop is pretty smooth this is due to the lerping system as the values try to return to the base when walking has ended, but when transitioning

from one direction to another, it is not as smooth as it attempts to return to zero making a pause in the animation.The transitions from one animation to another are well-paced.
For the spider it is less smooth, as it is essentially still very experimental, so it looks a bit clumsy, but this can be fixed with some adjustments, such as reducing the movement speed, and I believe the set up of my bones may be causing some issues looks-wise.

The speed of the animation seems to be well set for the animations the characters need to perform, and if they are lacking the speed can be adjusted to fit easily, but as it stands I believe the speed is well set up.

While the character's animations are smooth and somewhat natural, the spider could still use some work to get to be really natural.

The game handles animations and interruptions mostly through code, through me giving an interaction option to play or stop an animation and the game reacting accordingly, most of the parameters for this are set up through code.

The game handles animation blending simply through the blendspace for the character, and through the IK script and unity's animation rigging for the spider.

The layers of animation being blended are discernible, as the player's bottom half is using my procedural pose to pose animation while the top half uses an IK set up from unity's animation rigging package.

The transition from walking to stopping is relatively smooth for the player, while going from one direction to the other is too abrupt and is something I will look into to discover how to fix directly, I assume one way to fix it is to make sure that if the character is in motion the pose to pose animation does not stop, but keeps the values moving until stopping is necessary. The spider's is much smoother as the animation is fully procedural, so stopping turning and moving all happen at the code's discretion to make it as accurate as possible.

The advantage of this method is control over parameters that you can't have with premade animations to create the best possible animation for each situation, but in the case of the character, there is still poses required, though I believe if I were to find a way to mix both methods, this would be one of the best possible options for procedural animation. It also saves time as full on animations do not need to be made for this system to work properly.

The disadvantages of this is it requires a lot of knowledge of how the actual system works to make proper changes, and the animations may not be as artistic as they could be if made by an animator.

For me, this project shows a significant improvement in my knowledge of animation and how far I can take it depending on what I know and how it works. The character animations, even

though still faulty, show how far I can push myself in regards to experimenting and finding out new and interesting ways to solve old problems.The procedural systems offer immense potential for optimization and innovation, bridging the gap between manual artistry and code-driven precision.

Overall, this stage demonstrates a clear trajectory of growth in regards to my application of both theory and practice in computer animation. With continued focus and refinement, the techniques employed here could evolve into highly efficient and expressive systems, contributing meaningfully to interactive experiences for my future games, projects, and beyond!

Art used:
Elevator door by 1-3D.com:https://sketchfab.com/3d-models/elevator-door-6704273f7f9644bfb875d978486494eb

Low poly spider(rigged) by Mr Eliptik:https://sketchfab.com/3d-models/low-poly-spider-rigged-5d04379f28bc418cb0699055183ebf92

Fantasy spider by Dante's Anvil:
https://assetstore.unity.com/packages/3d/characters/animals/insects/fantasy-spider-236418

Wall textures adjusted by me originally from julio sillet:https://www.artstation.com/marketplace/p/X1zP/free-concrete-pack