Procedural Animation｜Jolly Penguin

Name: Avery Chang (Chun-Yen Chang)

Date: 05/30/2022

Houdini Version: 19.0.383

Professor: Deborah Fowler

Important Statistics:

|	Mantra Statistics
Average Render Time	3.5min
Frame Count	1
Resolution	1280x720
Diffuse Quality	2
Diffuse Limits	3
SSS Limits	1
Noise Value	0.01
Min Rays	2
Max Rays	9
Light Count	1x Env Light
	1x Sun Light
Primitive Count	25097

Project Description:

Reference | Render

The goal for this project is to recreate the machanics of the penguin slide toy. Using constraint with expression to mimic the mechanic for climbing up the stairs and RBD simulation for sliding down the slide.
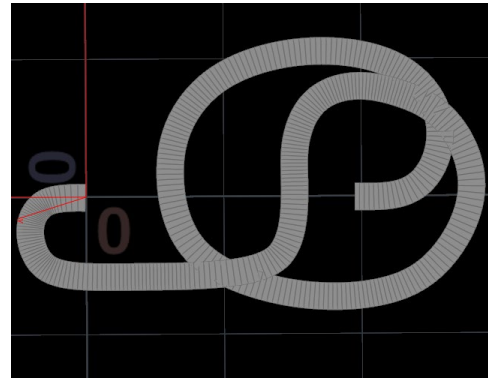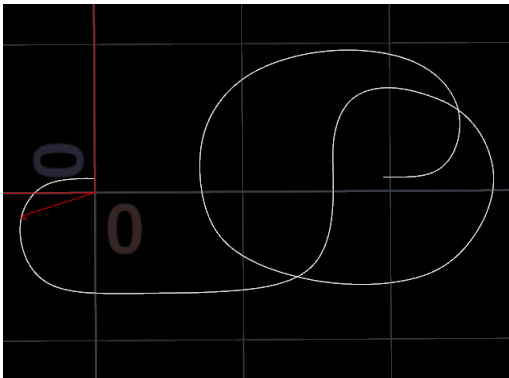
Technical Guide:

Modeling

1. Stairs

   Using **pointwrangle** to create points procedurally. Then using **add** and **polyextrude** to connect the points to make the geometry.
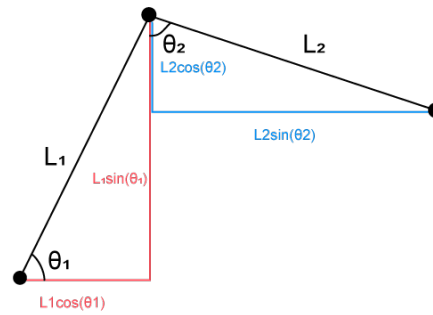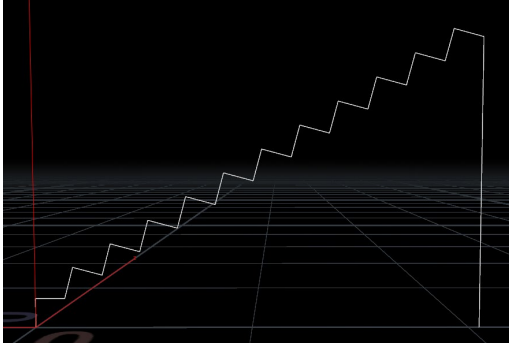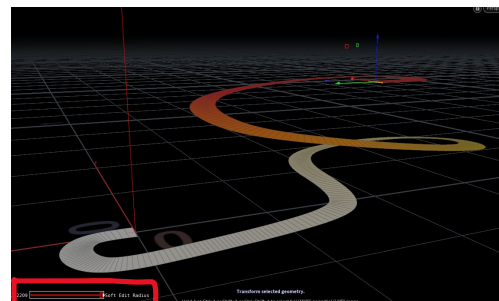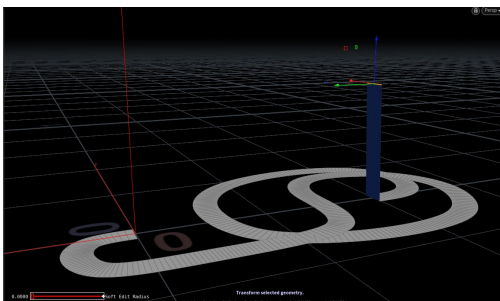

2. Slide

   First, using **curve** to graw the desired path. Making sure there's no height contained by using "@P.y=0;" in **pointwrangle** so after **polyextrude** they will be all facing up.

   Grabling each starting and ending edges of the slide then adjust it to desired height. Increase the value of **Soft Edit Radius** to smooth the height between.
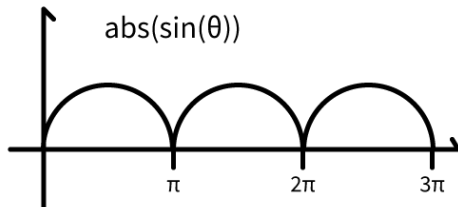

   To create more detail for the slide, use **polysplit** and **groupexpression** prepare for **polyextrude**.
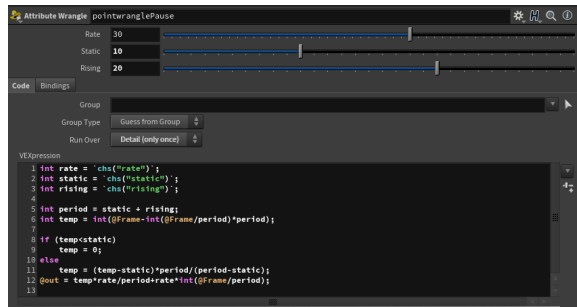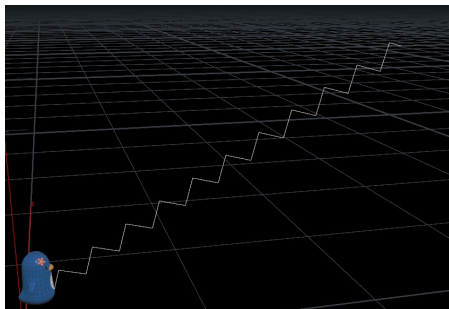
Animation

1. Stairs – Constrants & Expressions

   Using **transform** with sin funcion to make the rising and dropping animation.

   180 degree (π) is a cycle for the up-down animation.

   abs(ch("height")*sin(6*($F+ch("../startF")))) => 30 frames per up-down cycle

   *Pause expressions:* http://deborahrfowler.com/MathForVSFX/StartNStop.html

   Using **contraint** to make the penguin follow the path of the stair. The **position** of **constraint** range from 0 to 1, corresponded to climb from bottom to top.

   - 11 stairs => 11 up-down cycles
   - 30 frames per up-down cycles
   - Total animation range from value 0-1
     ⇨ $F/30/11
   - Adding pause expressions from **pointwrangle**
     ⇨ detail("../pointwranglePause","out",0) /30/11

2. Vibration on Stairs

   Using rotation and pause expressions to mimic the collision when bumping on each stairs.

   4*sin(12*detail("../pointwrangleRotate1","out",0))
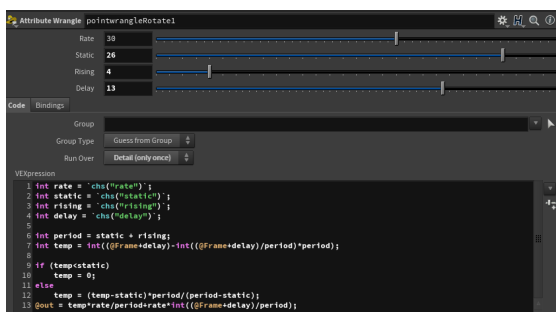
   Adding a *delay* variable to control the timing of the vibration.
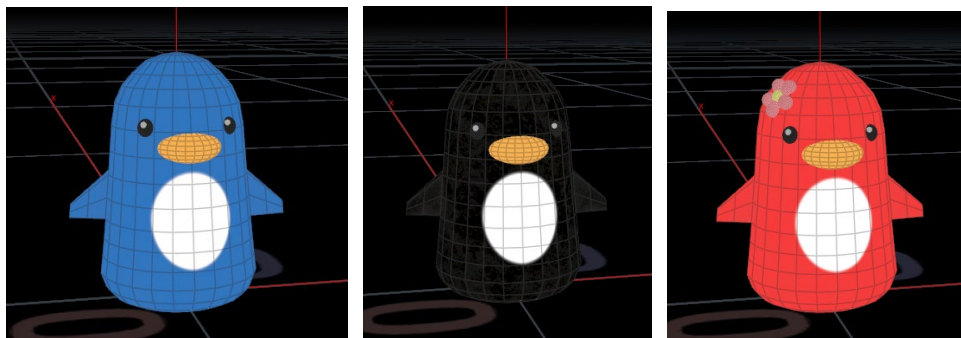
3. Slide – RBD Simulation

The penguin model is too complex to slide down the slide without falling and having the right rotation. After several testing, a box geometry works the best. Adding an obstacle to mimic the collision with the stair at the end of the slide.
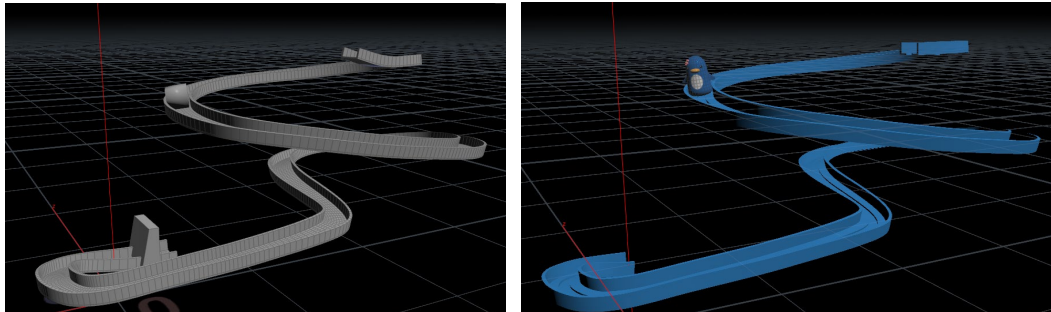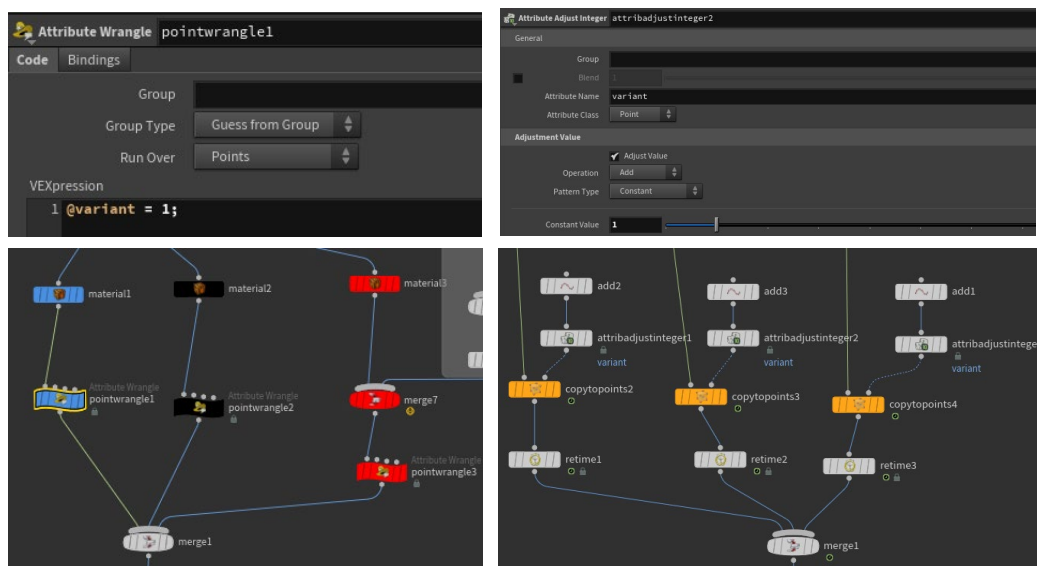

Keep only the position and rotation inforamtion by ***attributedelete*** then ***copytopoint***.

Variations

Instead of using ***for-each*** or ***copy-stamp***, I decided to use ***attribute-variant*** to make it easier to carry the attribute through different SOP networks.

Problem Encounter:

Timeloop

At the beginning of the project, I was trying to make the whole animation without thinking to use *timeshift* or *retime*. It comes more handy once using these nodes. I made a *timeshift by Frame"$F%447"* to make the animation loops by 448 frames per cycle. Then use *retime* for each variants without worrying to break the animations.

Object Merge

While using object-merge to import my contrainted animation into SOP network, it doesn't work. Turns out to change default *transform* tab *into-specific-object* into *into-this-object*.

Final Submission Changes:

Look dev improvement, fixing textures and reposition lighting.

Credit and References:

Houdini Guide: http://deborahrfowler.com/index.html

Penguin Slide Reference: https://www.walmart.com/ip/Fun-Playful-Penguin-Race-Set-with-Flashing-Lights-Music-On-Off-Button-for-Quiet-Play-Jolly-Penguin-Slide-Playset/649658469

Copy to Points Variant: https://www.youtube.com/watch?v=bBalom84Ryg