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Intro 1

Welcome back...

In this video we will create a Metasound in UE 5.1 for a creaking door.. This can be adapted for a floorboard creaking sound, and even squealing tyres..

Intro 2

The Metasound is based on the stick slip model where friction is broken in a series of steps...

The rate of impulses increases with the force applied...

The impulses are passed through a resonator modeling the material of the object, such as a wooden door...

This will be a simple Metasound implementation with no UI and we will demo the Metasound using the knob widgets within the Metasound...

In video 08 I covered how to open an Unreal project and a metasound source so I will not repeat it here.

Slides 1.x Smoothed Force

First we create a smoothed input for the force applied to the door...

Open a new Metasound source called Door Creak..

Delete the UE Source One Shot...

Add An Interp To Node and change the interp time to 0.2. This adjusts the rate of smoothing of the force on the door input...

Drag a connection from the Target pin. Release the mouse button and select Promote to graph input...

Name the input force..

This is the smoothed force. To add the comment select the nodes, right click and select Create Comment From Selection...

Save the metasound...

Slides 2.x Stick Slip Threshold

Now we create the threshold at which the friction breaks and the stick slip cycle starts...

Select a trigger on threshold float node and change the threshold to 0.3.
The type should default to Rising Edge which is what we want...

Duplicate this node and change type to falling edge. This will create separate triggers when the force goes above and falls below the threshold of 0.3...

Connect the Interp To Value pin to the In pins of both Trigger on threshold nodes.

Save the metasound...

Slides 3.x Impulse Generator

Now we generate the impulses...

First we add a Trigger repeat that generates a series of triggers and connect the start and stop to the out pins of the thresholds...

Then Add an AD envelope audio and attach to repeat out...

Promote the Attack Time to graph input by dragging from the pin, releasing the mouse button and selecting...

Set the Default to 0.0005 and the range from 0 to 0.01. The default value is rounded when displayed in the knob...

Promote the Decay Time to graph input... Set the default to 0.003 and the range from 0.001 to 0.01...

Promote the Attack Curve to graph input... Set the default to 0.272 and the range from 0 to 1...

Promote the Decay Curve to graph input... Set the default to 0.22 and the range from 0 to 1...

The last 2 parameters control the shape of the impulse.

This will generate the repeating impulses... We will calculate the period later...

Save the metasound...

Slides 4.x Jitter Generator

Now we need to apply some random variation. We will apply jitter to the period and the amplitude...

First we add a random float node that creates a random float between 0 and 1...

Then we save this as a variable called Jitter. Drag from the Value Pin, release, and select promote to graph Variable...

Rename jitter....

Jitter will be used as a delayed variable so will need to be primed and then regenerated every repeat. So we add a trigger Any 2 node and attach to on play and the trigger repeat node in the impulse generator, and the output to the next random float...

This is our Jitter generator...

Save the metasound...

Slides 5.x Period Calculator

Now we can calculate the period...

First we drag in the Jitter variable to the graph. Note that we have the option for a delayed variable. This is what we want so hold the Alt key as you release the mouse button...

The jitter button will appear with a clock denoting it is a delayed variable. We are effectively creating a loop here so the delayed variable from the previous cycle must be used...

We want to control the amount of jitter so we add a multiply float node and connect to the jitter and promote the other pin to input named Jitter Sens. Set the default to 0.2...

As the force increases the period of the impulses decreases so we subtract the value of the force from 1 using a subtract node, setting the upper pin to 1, and connecting the lower pin to the smoothed force...

Now we add the jitter. Multiply the inverted force by the scaled jitter and add this result to the inverted force...

Now we scale the Inverted force to create realistic values for the period...

We add a divide float node and promote the bottom pin (numerator) to graph input. Set the range from 5 to 15 and default 10. Name it period range. This defines how wide the period values are...

Then add an add float node and promote one pin to graph input. Default 0.01, range 0.001 to 0.05. This is the minimum period length...

Convert the float to time and attach to the period node in the impulse generator.

That completes the Period calculator for the impulses

Save the metasound...

Slides 6.x Amplitude Jitter

Now we work on the amplitude of the impulses

Like in the period calculator we get the delayed Jitter variable and multiply it by a value promoted to Graph input. This is called Amp Jitter Sens with default value 0.1 and range from 0 to 1...

Then we multiply this value by the out envelope of the impulse generator using an audio multiplied by float node and add the result to it with an add audio node...

Finally, we multiply the signal by a float for gain adjustment...

This gives us the Amplitude Jitter...

Save the metasound...

Slides 7.x Wood Material

Next, we generate the resonances created from the wooden material

We will create a new type of metasound called a metasound patch. This si simial to a function in blueprints and allows efficient reuse of code...

Right click in the Content draw metasound folder and select sounds, metasounds, metasound patch and name it Wood underscore MSP...

Double click it to open in the editor...

Add an Input named input with type audio...

Add an output named output with type audio...

Drag in the Input and the Output into the graph...

Add 6 State variable filters connected in parallel to the input...

The first filter has cutoff 62.5 and resonance 1...

The second has cutoff 125 and resonance 1...

The third has cutoff 250 and resonance 2...

The fourth has cutoff 395 and resonance 2...

The fifth has cutoff 560 and resonance 3...

The sixth has cutoff 790 and resonance 3...

Add a multiply audio by float node and multiply the signal by 0.2...

Add these 7 nodes together, connecting from the band pass pin of the filters, and pass the result to the output...

Save the metasound...

Go to the door creak metasound

Add the Wood underscore MSP graph and connect to the amplitude jitter output...

Save the metasound...

Slides 8.x Wood Panel

Now we create and open another metasound patch and name it Wood Panel underscore MSP...

This is a series of delays...

Add the input, type audio, and output, type audio, as before...

Add 8 Delay nodes connected to the input in parallel. They all have Dry level 0, wet level 1, and feedback 0.05...

The delay times for the first 4 delay lines are 0.00452, 0.00506, 0.00627 and 0.008 respectively...

The delay times for the second 4 delay lines are 0.00548, 0.00714, 0.01012, 0.016 respectively...

Add these signals together...

And connect the result to a One pole high pass filter with cut off frequency 125, which in turn is connected to the output...

Save the metasound...

Open the Door creak metasound, add the Wood panel underscore MSP and connect the input to the Wood underscore MSP output, and the output to the Out Mono output...

Save the metasound...

Video 1 Demo

Hit the Green triangle play button to audition the metasound...

The force knob is the main control...

Turn it so it exceeds the threshold then turn it back...

I have exposed many parameters that will change the sound so this effect can be tuned...

Outro 1

I hope this was helpful. Next time we will make a whoosh effect. Hope to see you then...