

Learning Guide

Edit and Animate 3D Models with Spline

Introduction

Spline is a free-to-start 3D creation tool that allows users to create interactive 3D designs. Spline requires no coding experience and runs on a web browser. You can explore different materials, effects, and animations in Spline, and apply them to a 3D model you've created using a different tool.

This Guide will show you how to bring your own 3D models into Spline and add materials and animations to create interactive 3D experiences. These skills can help you elevate and customize your website with the unique designs you've created in Spline, or add your designs to other 3D projects to make them more dynamic and visually appealing.

Video Learning Guide for this Lesson:

<https://www.youtube.com/watch?v=YW6UZpiliV4>

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Prior Knowledge Check

This Guide assumes that you already have a 3D model that you will import into Spline to which you'd like to add materials and animations. Your 3D model should be in **.fbx, .obj, or .gltf** file format.

You can follow this Guide by using a 3D model that you've created with any 3D modeling tool, or explore our Learning Guides to create a unique model of your own:

- [Create 3D Models with Tinkercad](#)
- [Create 3D Models with SculptGL](#)
- [Generate 3D Models with Meshy](#)

To follow this Guide seamlessly, it is suggested that you work with an external mouse on your computer. Some functions may not be available with a laptop trackpad.

Step 1: Import a 3D model into Spline

Preview

To create an interactive 3D design in Spline, the first step is to bring in the 3D model you'll be working with. This section will help you start a project in Spline and import your model.

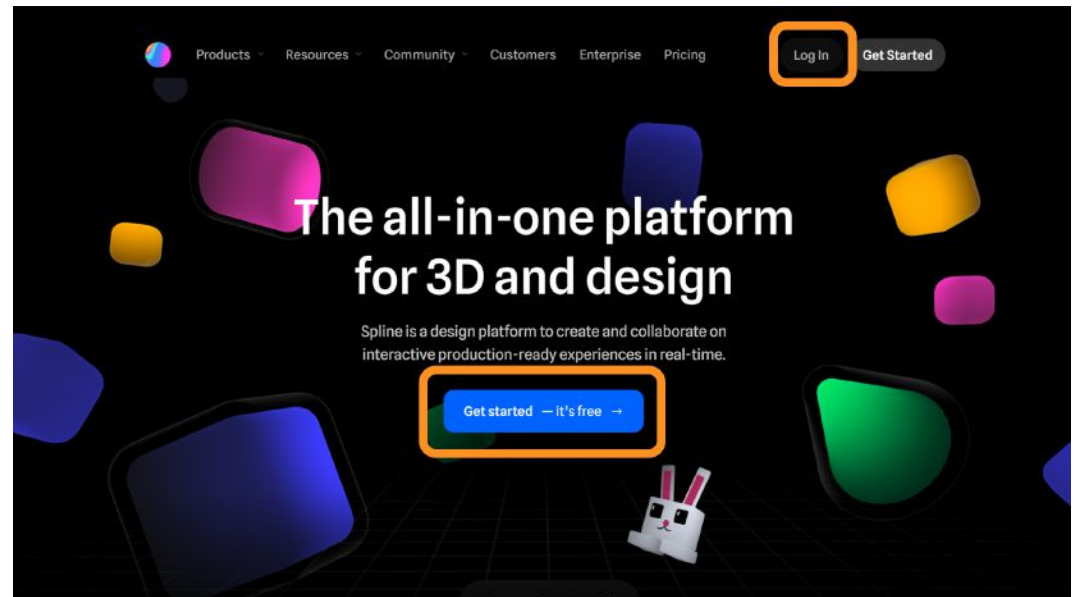
Experiment

LOG INTO SPLINE

Visit Spline on <https://spline.design>. Log in or create an account.

If creating an account for the first time, you will be prompted to answer some questions. Your answer to these questions will not change your ability to use Spline.

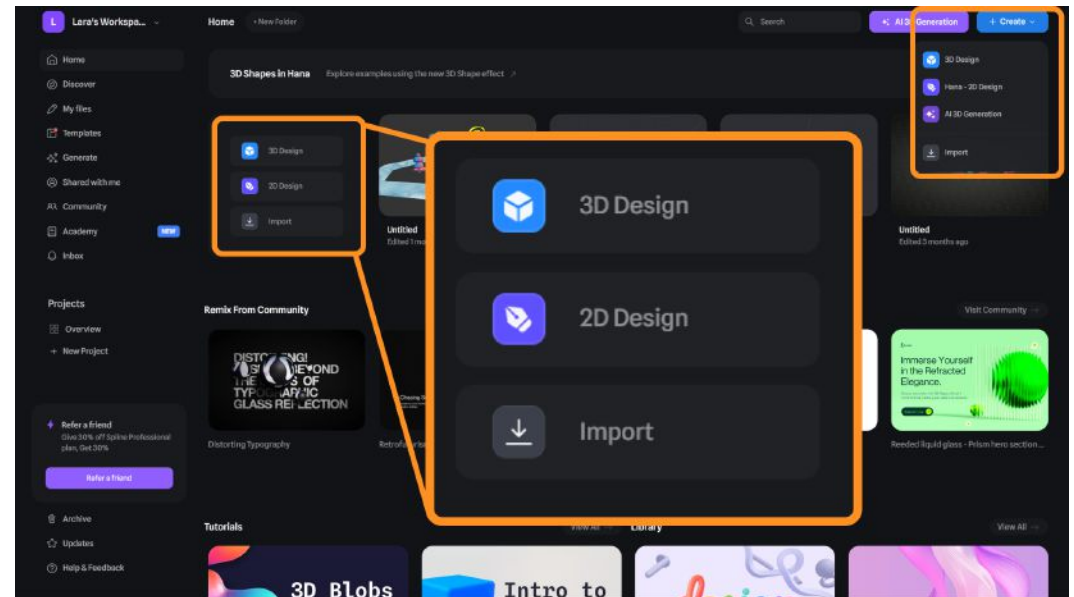
Spline might suggest upgrading to a paid plan, but you can decline the offer and get started with Spline for free.



CREATE A NEW PROJECT

Click on the “+ **Create**” button in the top right corner and select “**3D Design**” to create a new project in Spline. You can also find this option in the middle of your main screen.

If using Spline for the first time, you will be prompted to follow a tutorial when you create your first project. **Complete or skip** the tutorial before following the next steps.



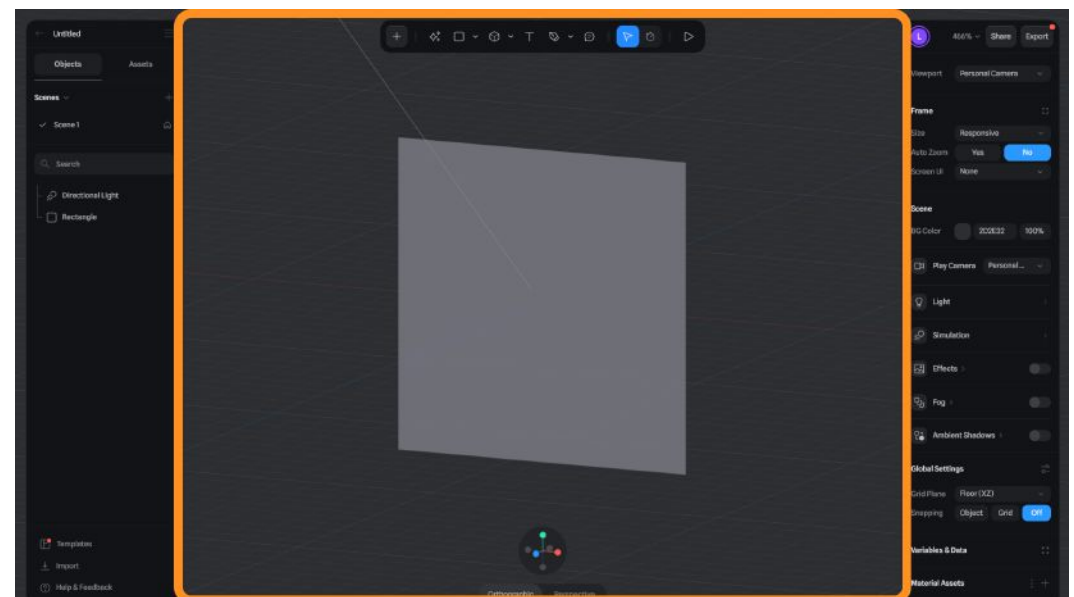
NAVIGATE THE VIEWPORT

The **viewport** is the 3D interactive window in the middle of your screen.

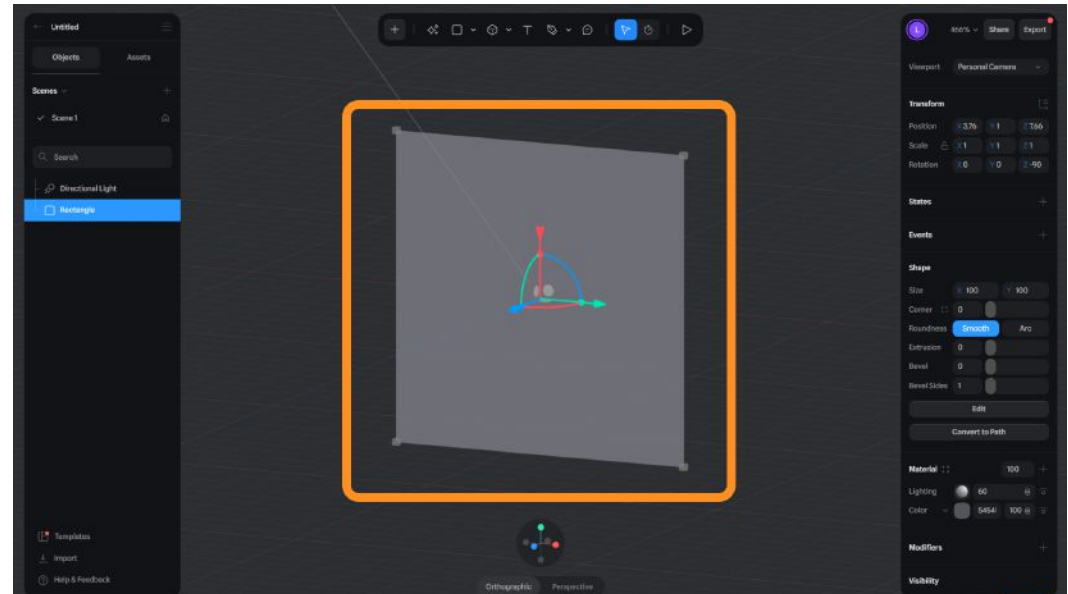
To rotate around in the viewport in Spline, **hold ALT (OPTION for macOS)** and use the **Right Mouse Button**.

To pan, click on the **Middle Mouse Button** and drag.

Zoom in or out with the **Scroll Wheel**.

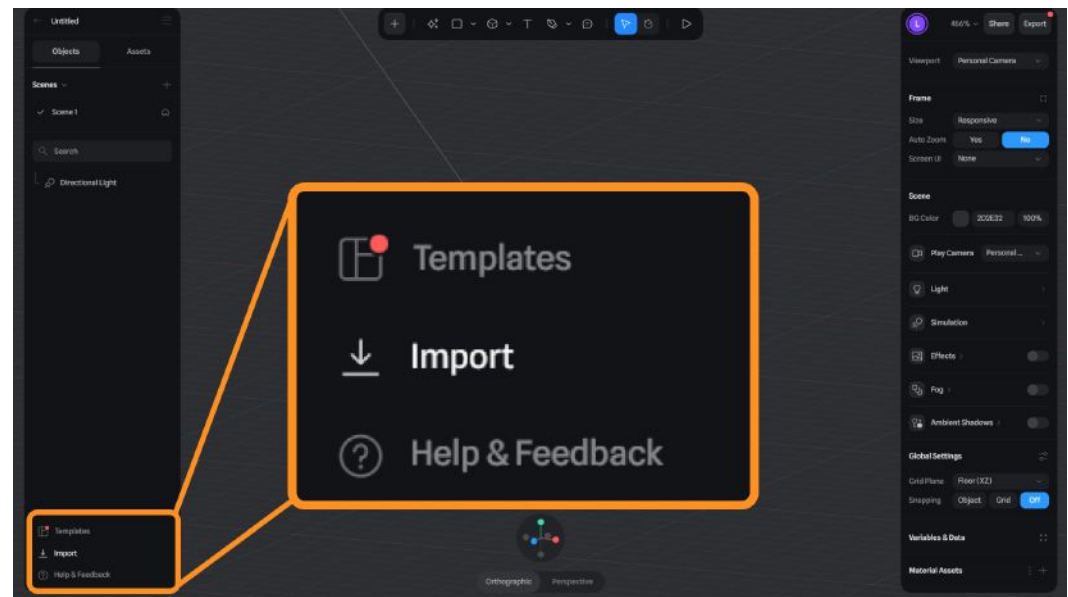


Before importing your model, click on the pre-existing rectangle shape in your viewport, and delete it by pressing the **DELETE** key.



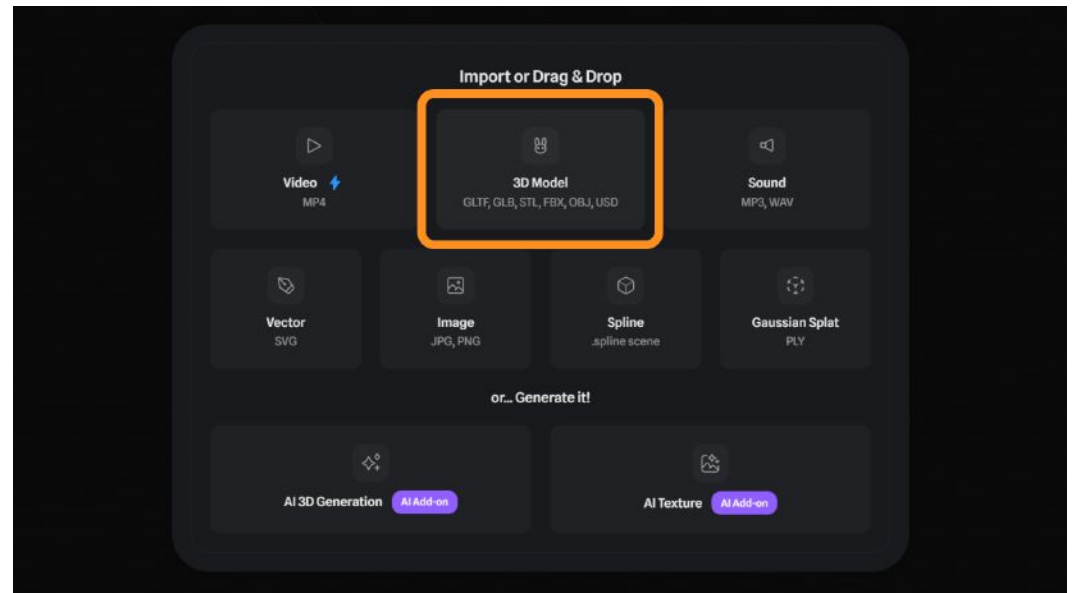
IMPORT YOUR MODEL

Click on the **Import** button on the bottom-left corner of the screen.



Choose the **3D Model** option.

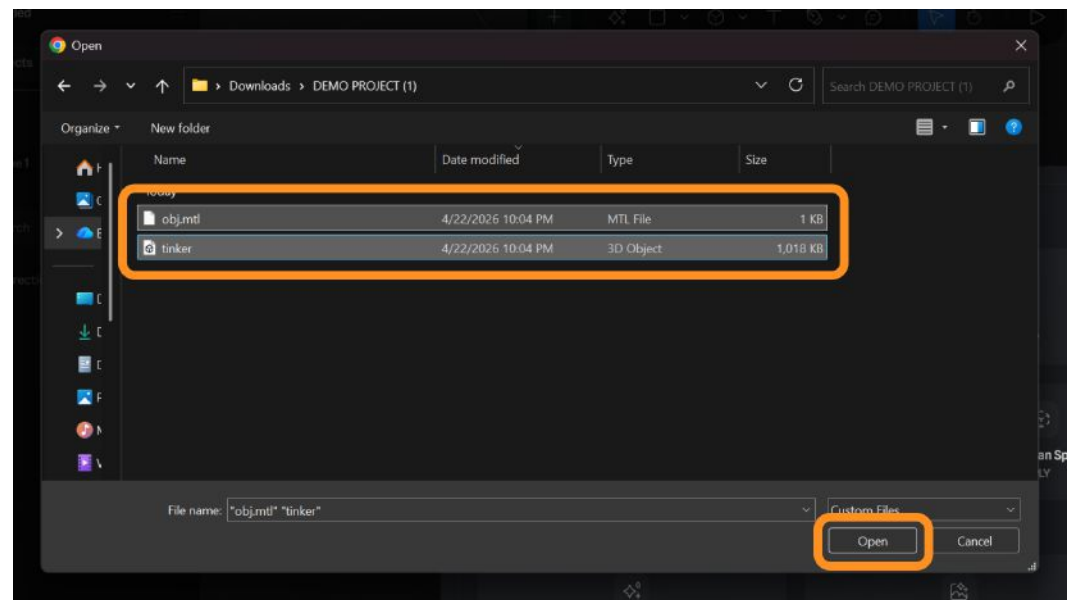
From the file selection window, navigate to the folder that contains the 3D model you would like to import.



If using a model exported from Tinkercad, the downloaded folder will include two files. **Hold SHIFT** to select both files and click **“Open”** to import them to Spline.

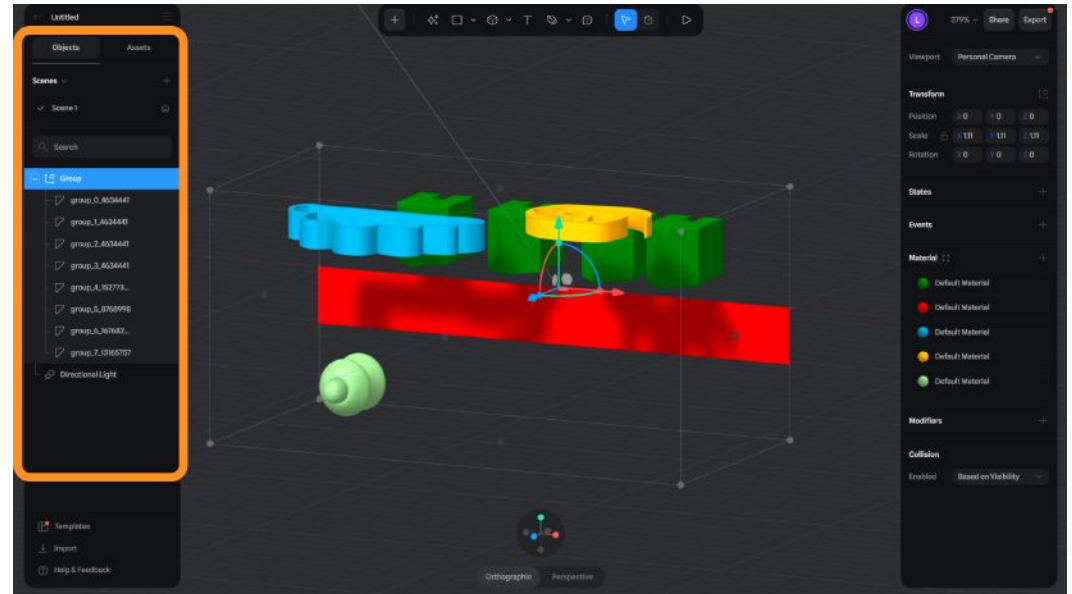
If you have any issues importing a Tinkercad model, make sure you’ve **unzipped** the downloaded file from Tinkercad. Right click on the zipped file and select **“Extract all...”**.

You can also import any other 3D model you have on your computer, as long as the file format is in **.fbx, .obj, or .gltf/glb** format.



You should now see your 3D model imported to the middle of the Viewport.

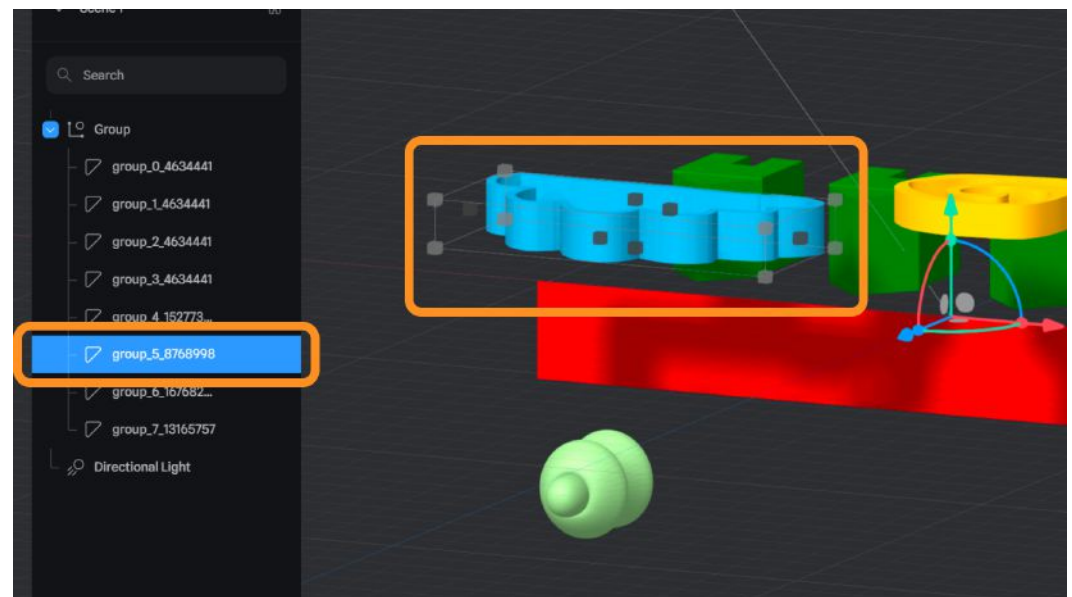
Everything you add to your Spline project will be listed in the **Outliner** panel on the left.



If your imported file contains multiple parts, they will show up under a “Group” in the outliner.

When you need to select all the parts of your model (to edit, move, etc.), you need to click on “Group” from the **Outliner**.

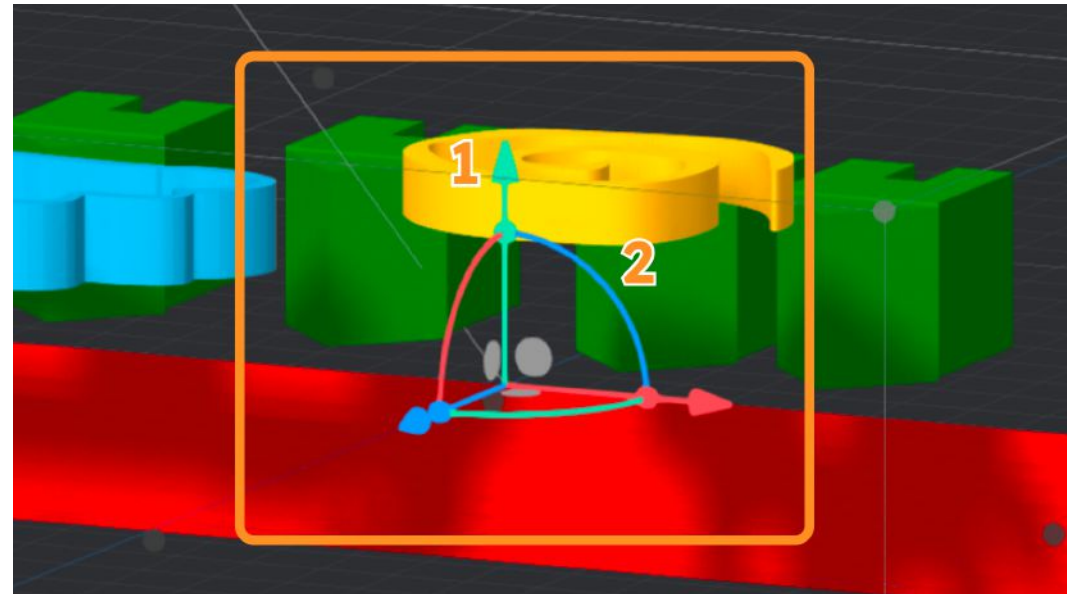
If you need to select a specific model, you can **double click** on the part in the **Viewport** or select it *individually* from the **Outliner**.



MOVE YOUR MODEL

Select a model, or the entire group, you want to move.

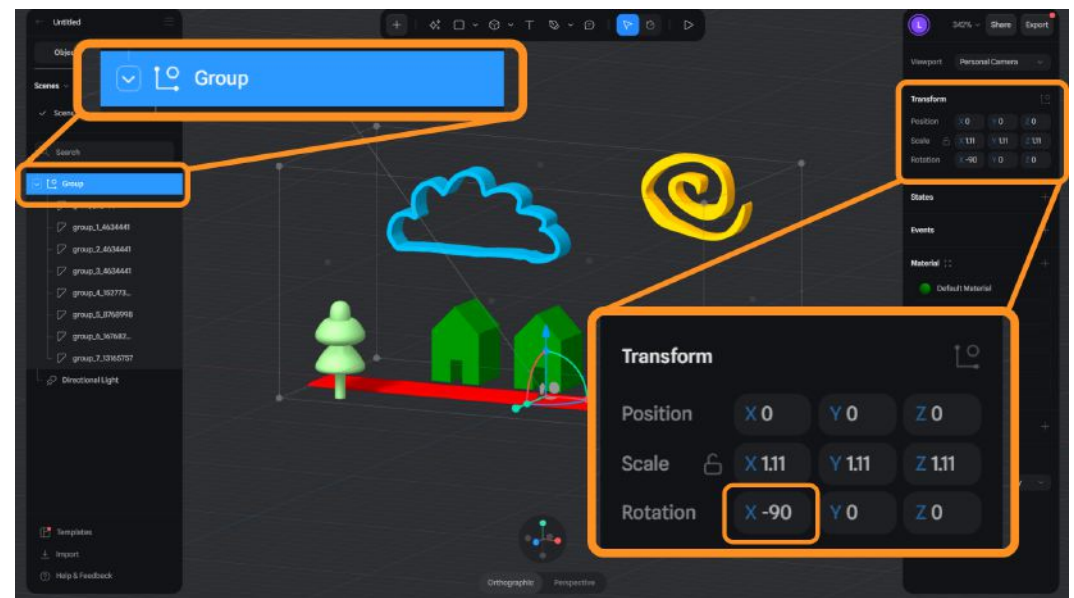
You can move the model in different directions by **clicking and dragging** the red, green, and blue colored **arrows (1)** and rotate it by using the colored **handles (2)**.



If you import a model, it might be facing the wrong direction upon import.

To fix this, make sure the **group** is selected from the Outliner if your model contains multiple parts.

Then, on the right panel, **click** on the “Rotation X” value and **type** on your keyboard to set it to “-90”.



To scale your model, click and drag on the small **spheres (3)** where the arrow and handles meet. However, keep in mind that this will scale your model in only **one direction**.

If you'd like to be more precise with your scaled model, or make sure it's scaled correctly **in all directions**, use the **Transform** window on the right and enter numbers on your keyboard.

For example, typing "2" on all X, Y, Z, boxes will double the size of your model uniformly.



Self Check

Were you able to bring in your model successfully and move it the way you wanted?

Step 2: Edit materials

Preview

Depending on the file you imported, your 3D models might already have color and materials applied to them, or they might just be white/gray. Regardless, Spline's own material setup will give you the opportunity to customize your materials even more. This section will show you how Spline's layered materials work.

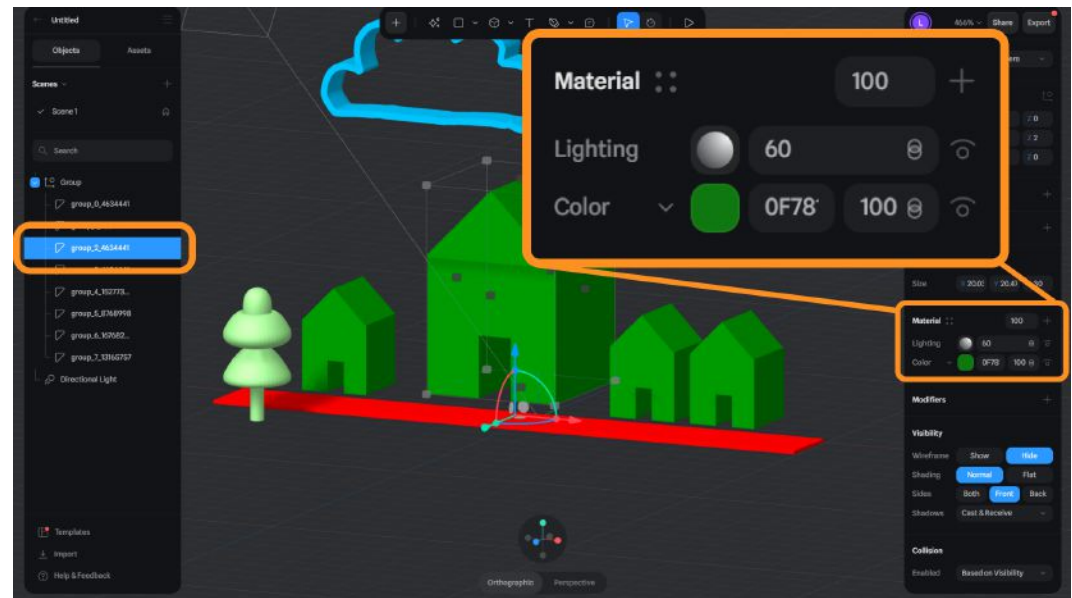
Experiment

ADD MATERIALS

Select a model in the Viewport to change its material.

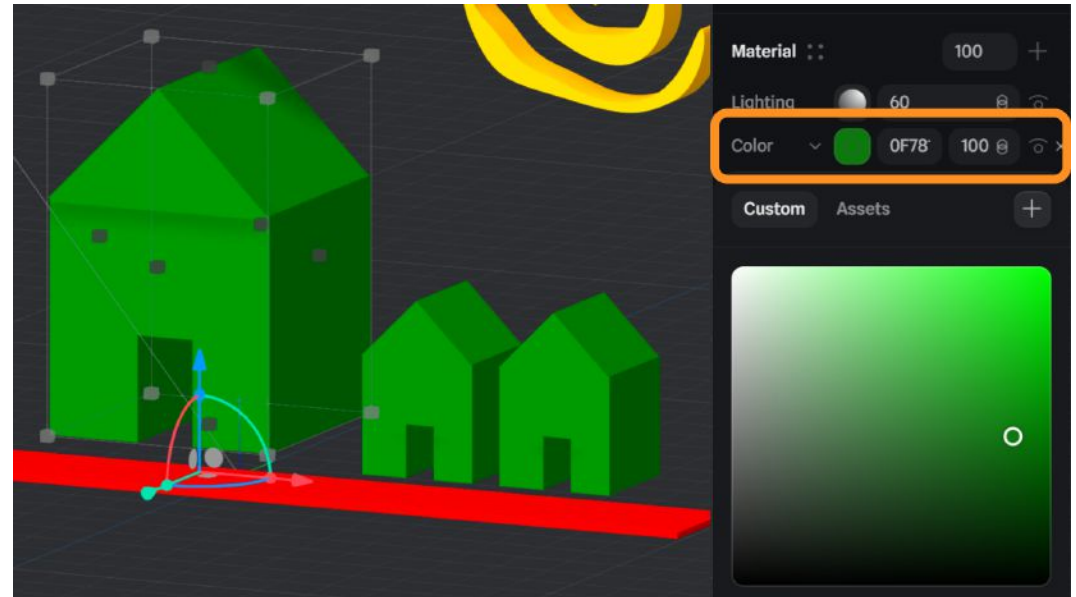
As a reminder, if you want to select an individual model instead of an entire group, double click it in the Viewport or select it individually from the Outliner.

On the right menu panel, go to the **Material** section.

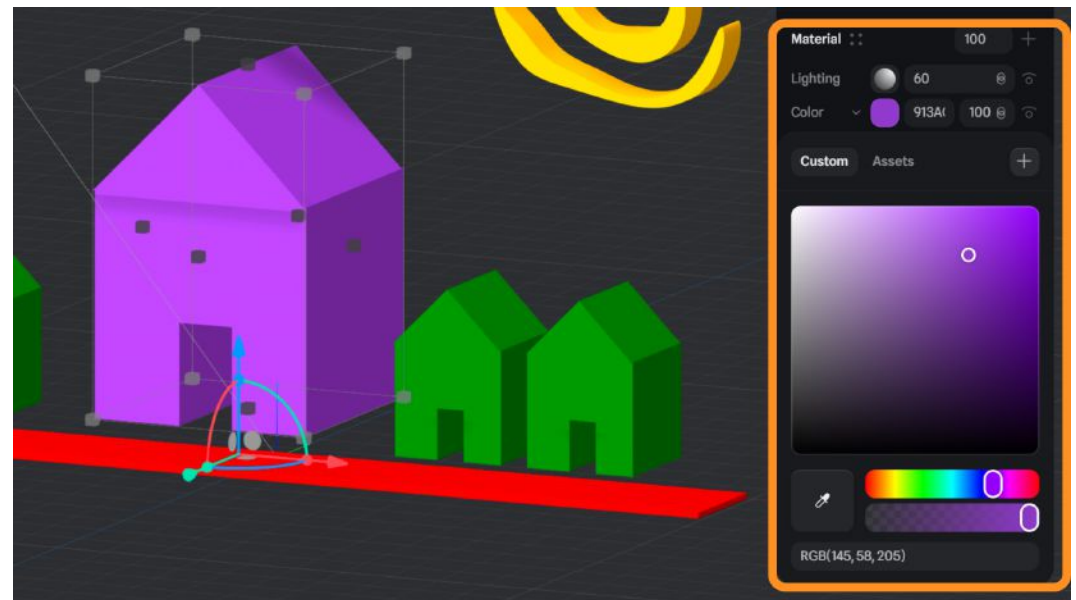


The model might already have a basic color applied to it.

Click on the square next to “Color” to change the color of your model.



Pick the color you want from the color picker window and the new color will apply to your selected model.

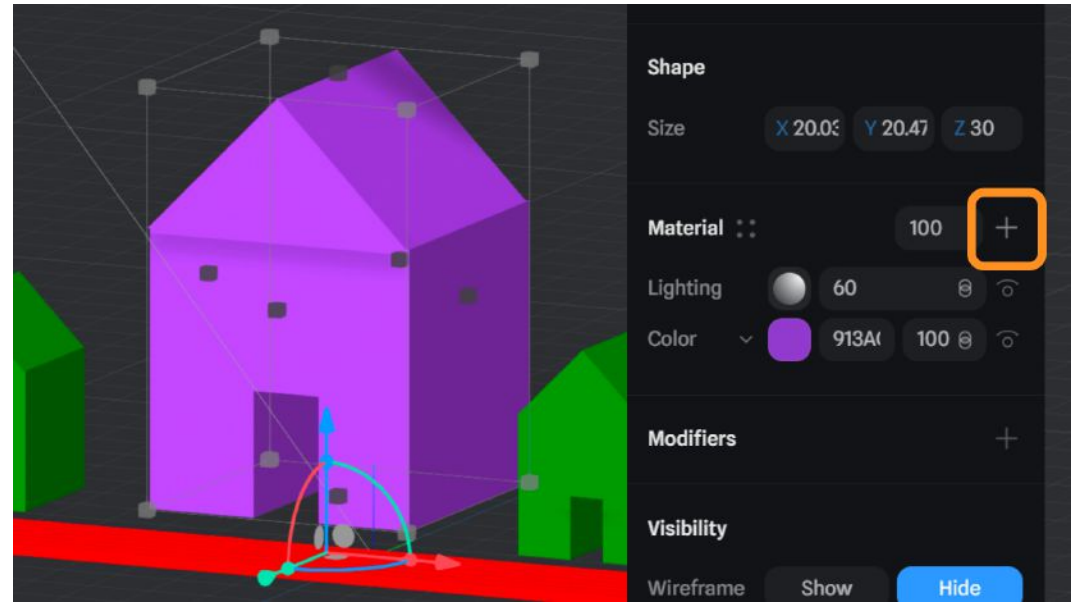


ADD MATERIAL LAYERS

The Materials system in Spline works in layers, which is similar to adding multiple filters on top of each other to achieve the look you want. By using the layers system, you can create more complex materials and looks.

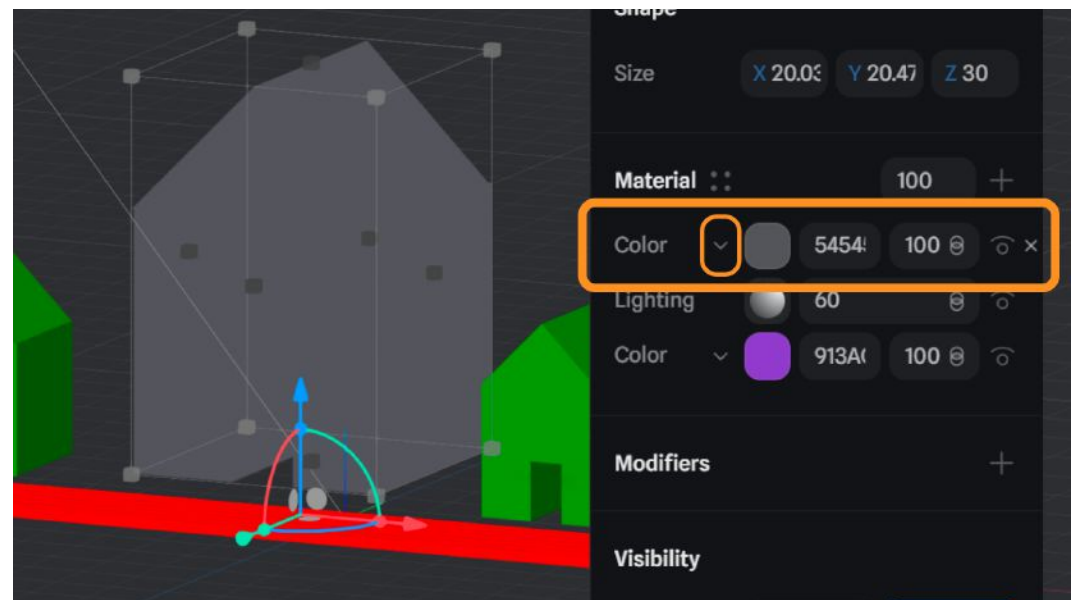
For example, instead of a solid color on your model, you can create a swirling mix of shades.

First, click on the **+** icon next to the Material section to add a new layer.

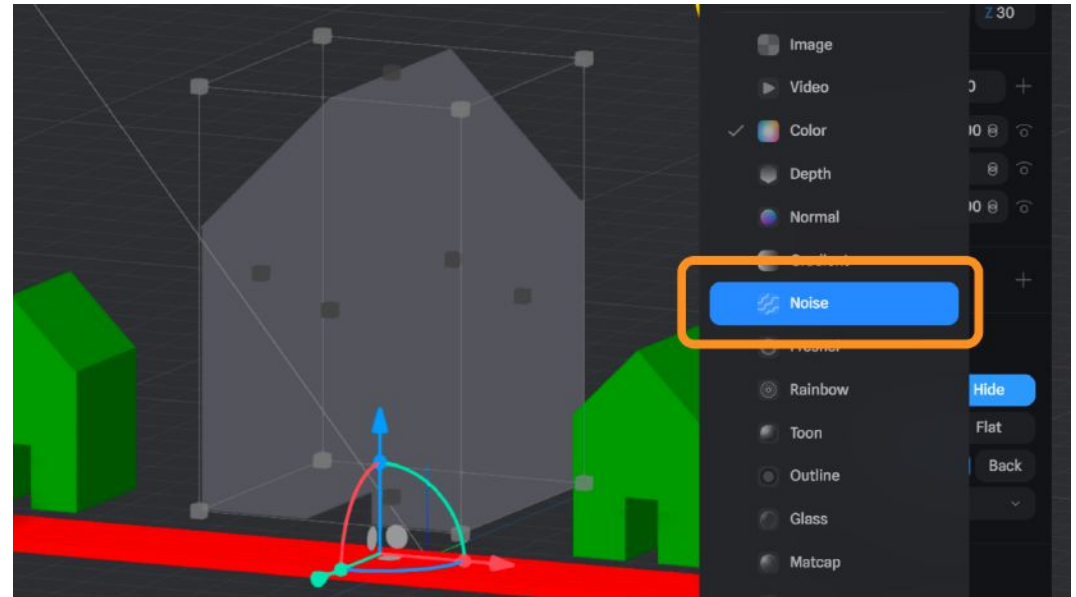


By default, Spline creates a gray “Color” layer, which goes on top of other layers and overrides them.

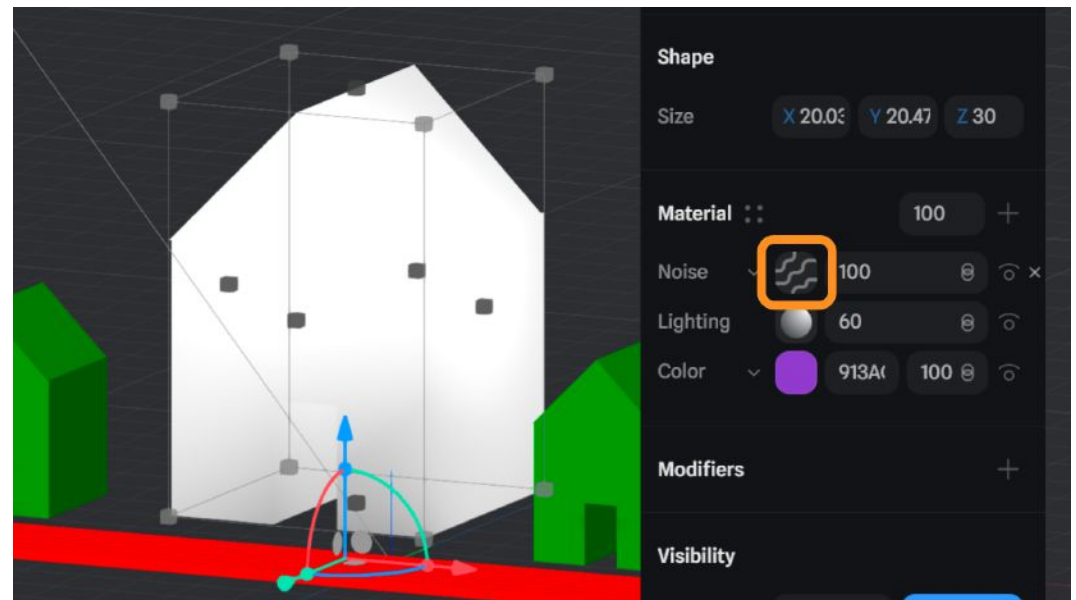
You will notice that your model has turned solid gray, because the “gray” Color layer is now **on top of** the previous Color layer.



You can change this layer to a Noise layer (or any other type of layer) by clicking on the small **dropdown arrow** next to the “Color” layer you just created and selecting “Noise”.

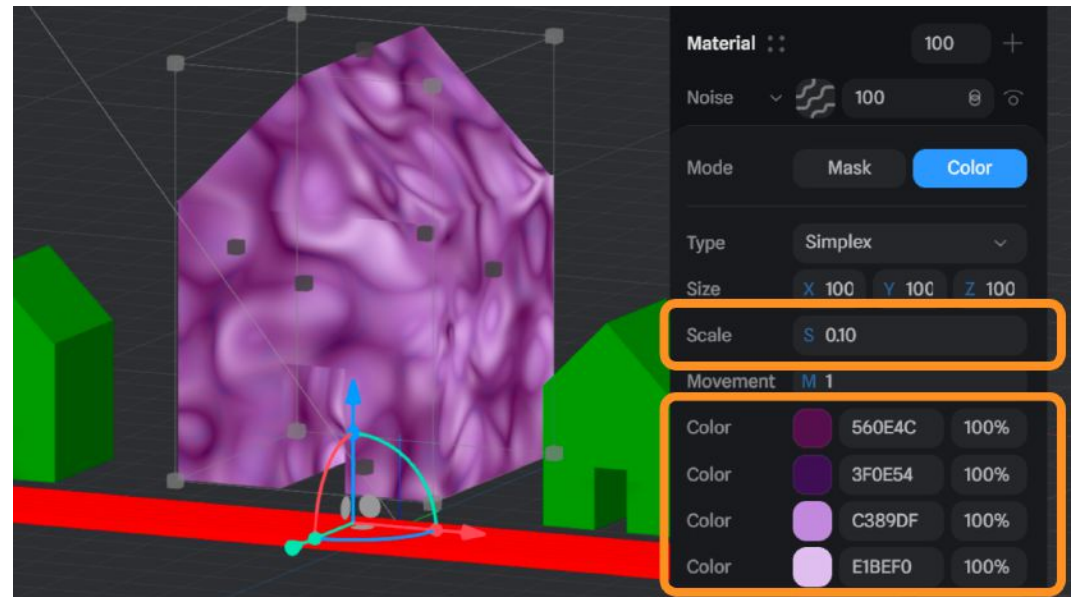


This option will create a layer that has a random noise pattern and 4 different color options. To increase the visual interest of the Noise layer, click on the **square next to the Noise dropdown** and edit the settings.

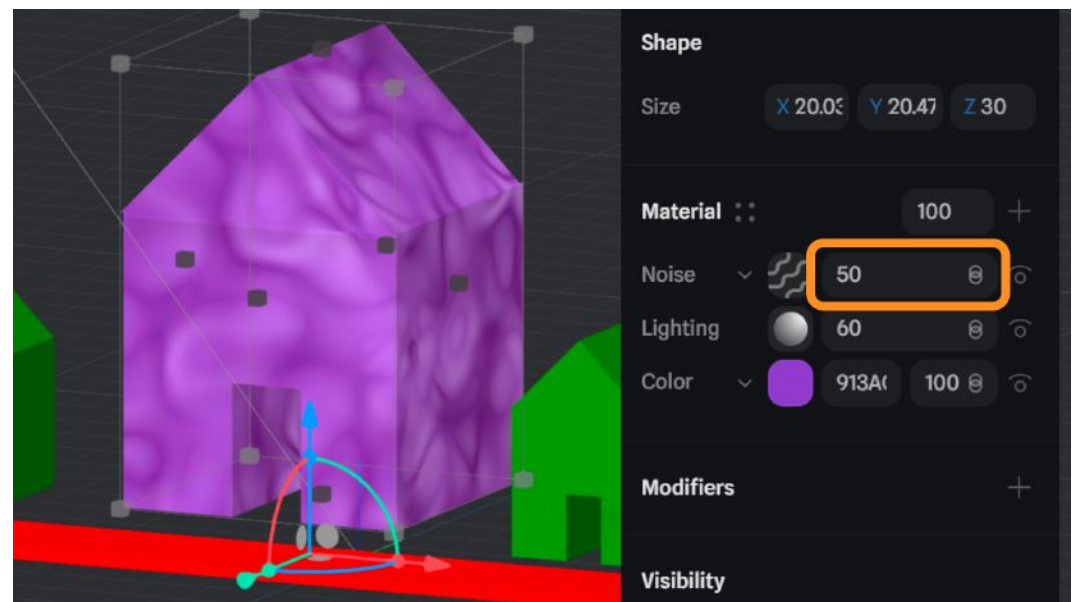


Change the **scale setting** until you achieve a grayscale pattern you like. Try a low number like “0.10.”

Then, change the four color options to make the noise pattern more colorful.

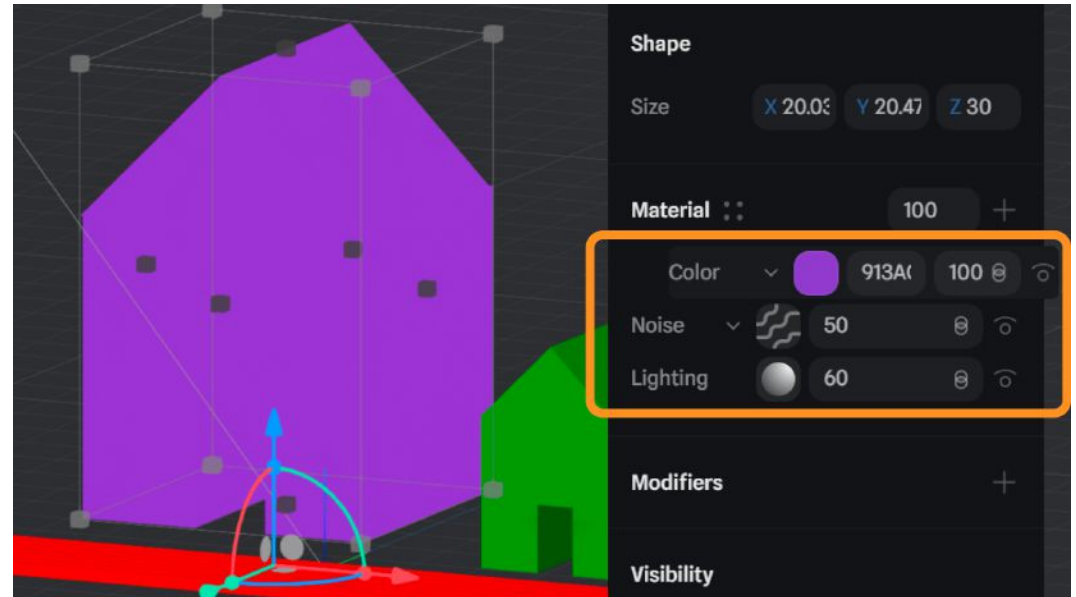


The number “100” next to a layer indicates the **opacity** of that layer. If you bring the opacity of the Noise layer to “50”, you will notice that the pattern you’ve created becomes half-transparent and you can see the original color layer underneath come through.



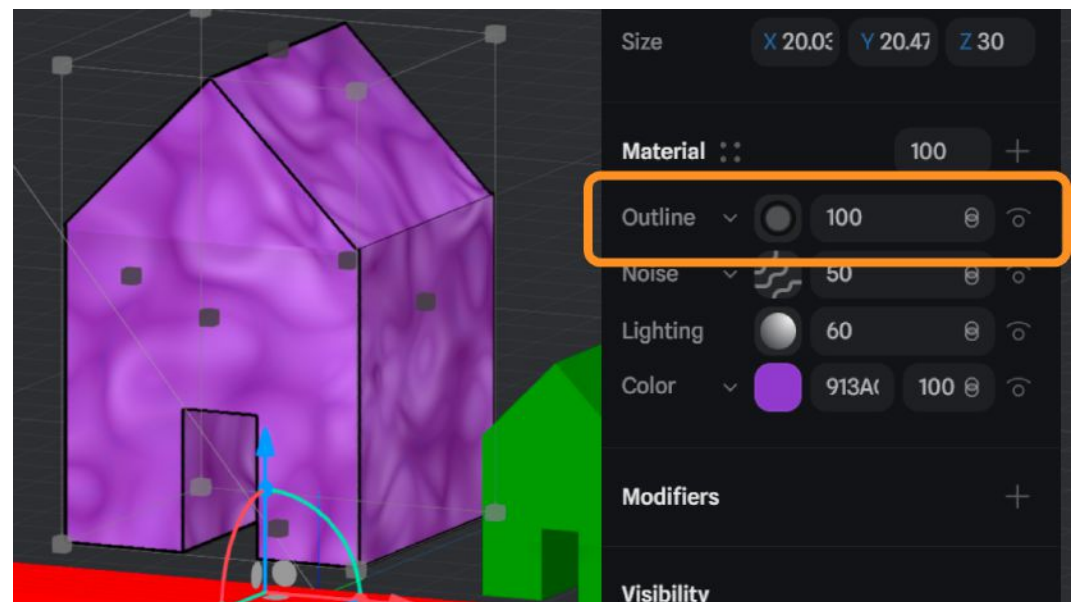
You can also change the order of layers to decide what sits on top. **Click** on the layer you want to move and **drag** it up or down to change its order.

This is one of the advantages of working with layered materials in Spline. Changing layer orders or opacity will let you test different looks without permanently changing your materials.



To customize your material even more, add a new layer with the **+** icon and this time, choose “Outline” from the dropdown menu. This layer will add a stylistic outline around your model based on the camera angle.

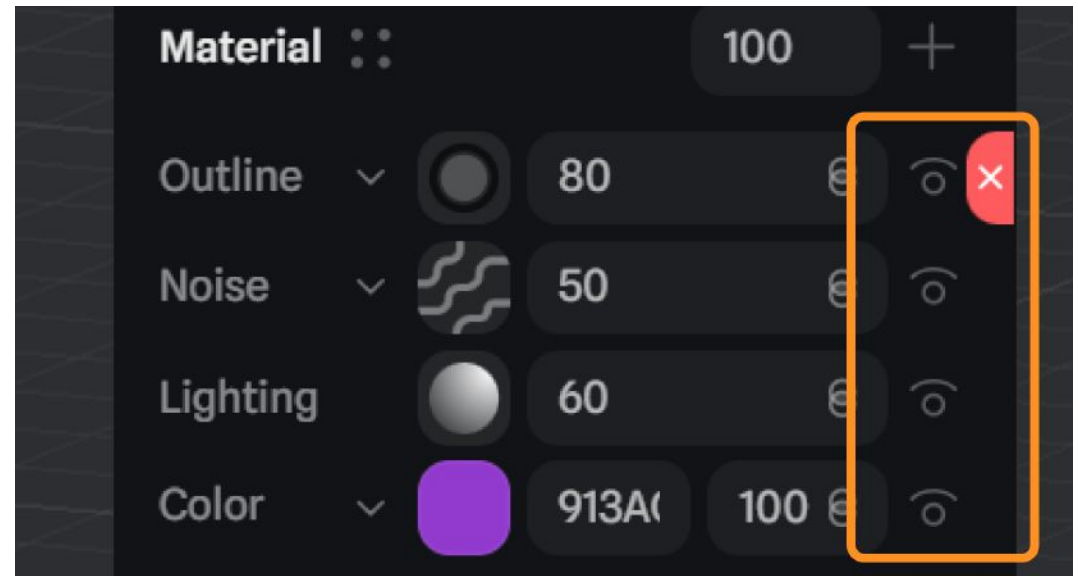
Adjust the opacity or other “Outline” settings as you wish.



If you wish to check how your material would look without a certain layer, you can **hide** a layer temporarily by clicking the **eye icon** next to the layer you would like to hide.

This is very helpful when you create a material with many layers and don't remember exactly what each layer does.

If you'd like to **delete** a layer completely, hover over the layer you want to delete and click on the small **x icon** on the right side of the layer. Keep in mind that this will completely remove that layer and all its settings.



Play around with different material layers and setups to explore what you like. Remember, you can apply different materials to each of the models in your project and have them all look different!



Self Check

Were you able to achieve the look you wanted using different materials and layers?

Step 3: Add effects to your project

Preview

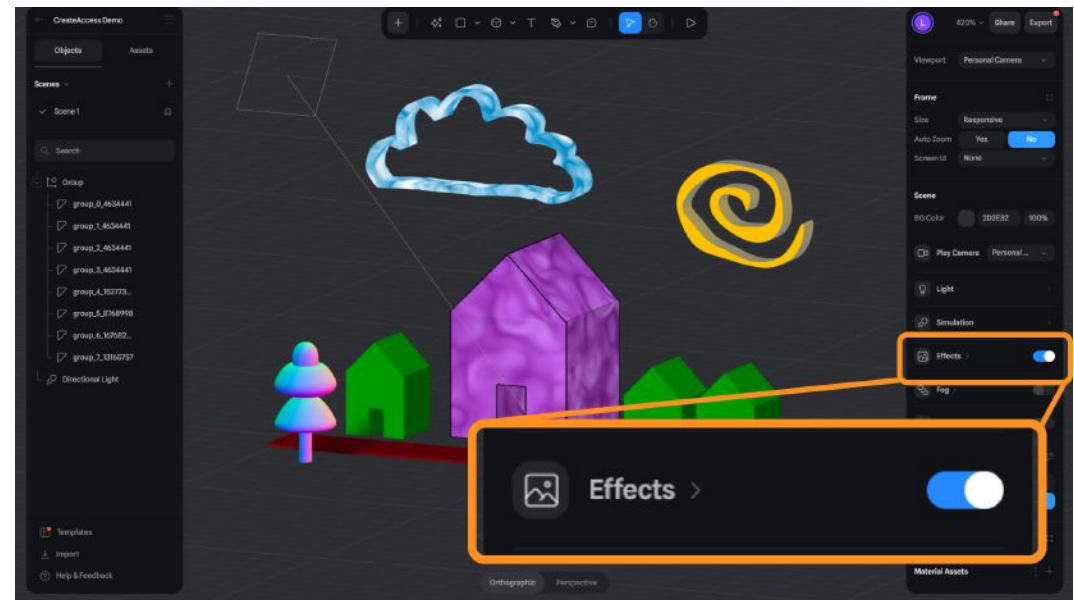
This section will show you how to add different visual effects to your Spline project. These effects will apply to your **entire project** and change the look of everything simultaneously.

Experiment

SELECT AND ADD AN EFFECT

Click on an empty area in the Viewport to open the general settings on the right. You can find all the available effects in the **Effects dropdown** on the right panel.

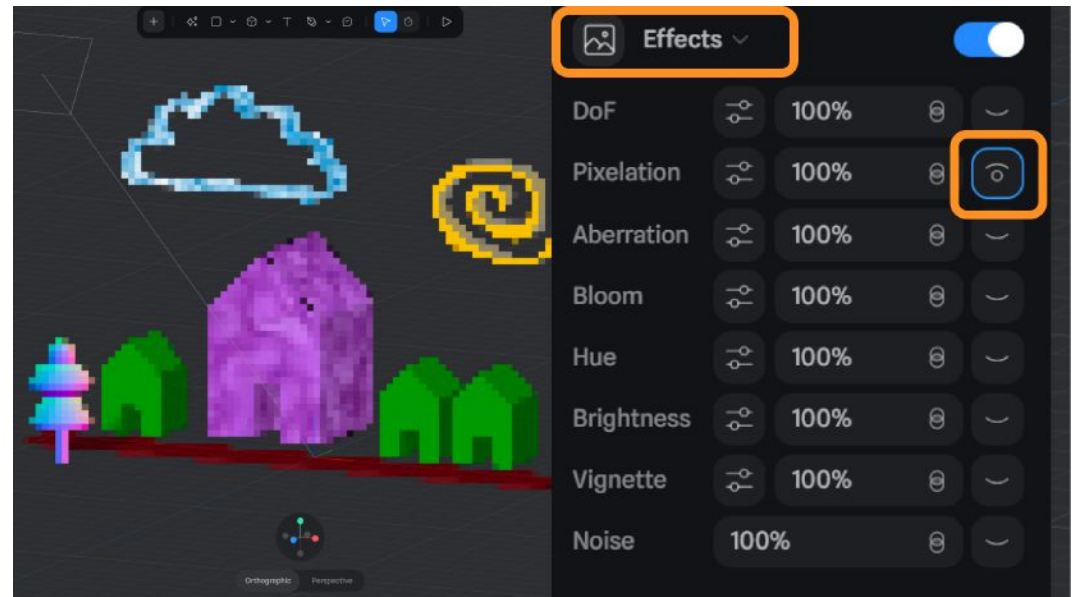
Toggle on the effects to make sure they will apply to your project.



Click on the **dropdown arrow** to see all the effect options.

Pick any effect you would like to apply to your project. Turn on the effect by toggling the **eye icon** on the right side of the effect.

The **percentage slider** next to the icon will determine how strongly the effect applies to your project. The default is 100%, but you can lower it to have a more subtle change.



All effects have special settings of their own. You can find these settings by clicking the **settings icon** next to each effect. Try different options and see what works for your project.



DoF stands for Depth of Field and will add a camera blur effect to the Viewport.

Pixelation lowers the resolution of the Viewport and creates a pixelated look.

Aberration uses the RGB (red, green, blue) values of the colors in the Viewport to add a layered effect.

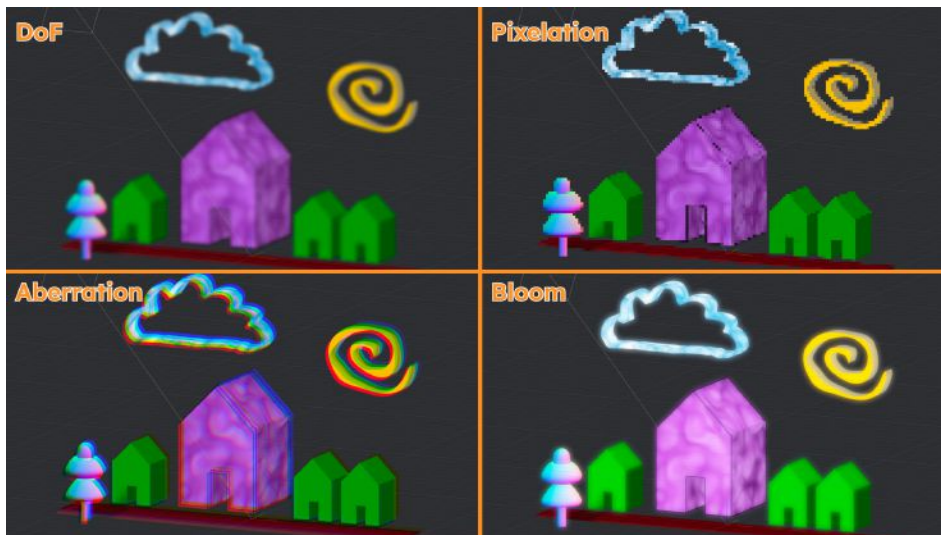
Bloom makes the objects in the Viewport glow.

Hue shifts all the colors in the Viewport to a different one based on its value.

Brightness increases the overall brightness/white value of the Viewport.

Vignette will add a filter to darken the edges of the Viewport for an artistic look.

Noise overlays a noise layer to the Viewport, making everything look jittery.



Self Check

Which effects did you use in your project? Were you able to use multiple effects to create a look that you liked?

Step 4: Animate your model

Preview

After you have imported your models into Spline and applied materials to them, you can now animate them. This section will explain how animation States and Events work in Spline and how to set up different types of animation sequences.

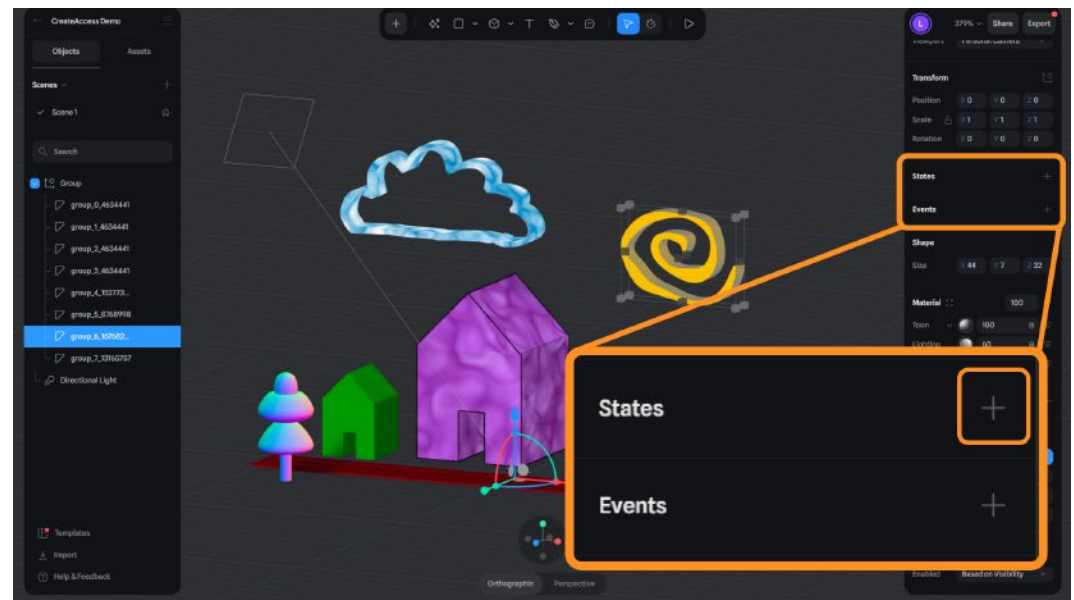
Experiment

ADD STATES

In Spline, **States** act as the defined positions at key points during a model's animation. Animations are created by setting up transitions between different States.

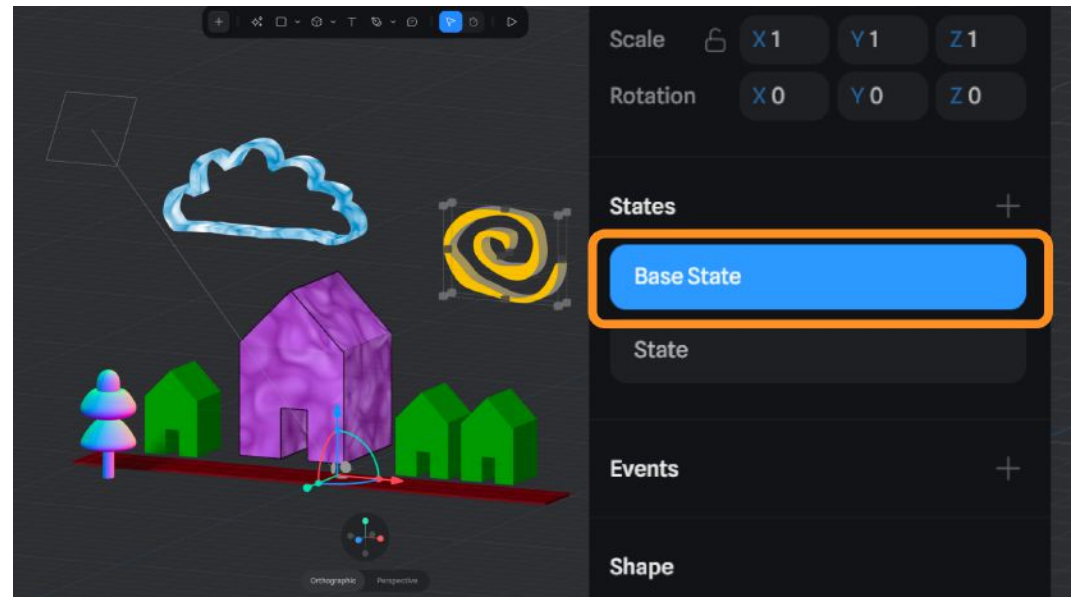
Start by selecting a model you want to animate and go to the **States** section on the right panel.

Click the **+** icon to add a new State. Two new states will appear: **Base State** and **State**.



Base state is the starting position of your model in the animation.

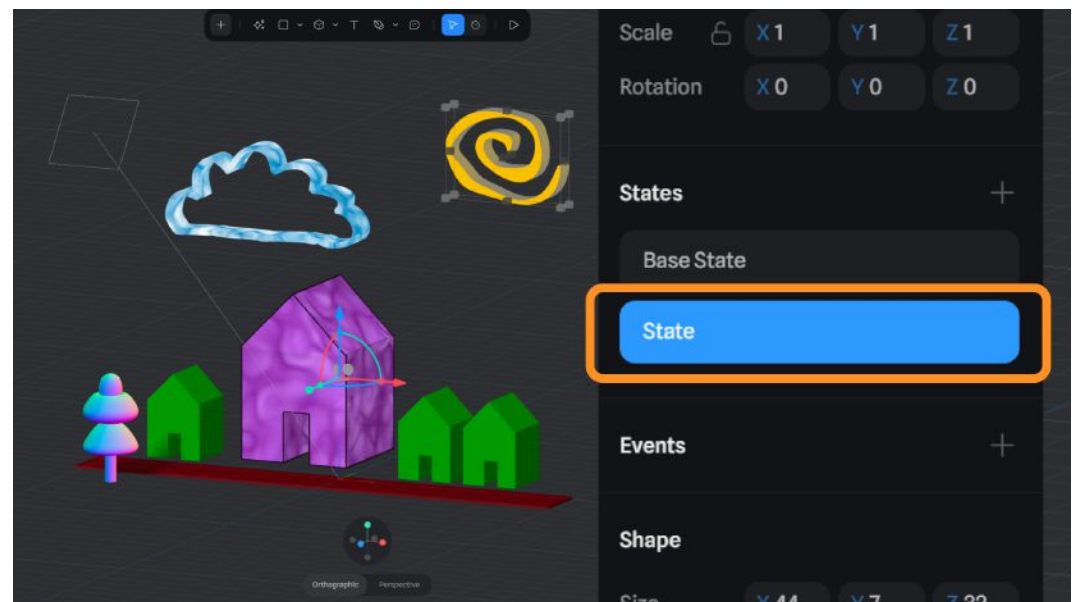
State is the next step in the animation. Here, you need to change your model's location, rotation, and/or scale to create some movement.



To start animating, make sure **State** is selected and change your model's location, rotation and/or scale.

For example, move your model to a higher position.

Switching between "Base State" and "State" by clicking on each will show you the differences. These will be the first and second positions of your animation.



If you'd like to add more positions to your animation, click on the **+** icon again to create a new state.

Select **State 2** and change your model's location, rotation and/or scale like before.

For example, make your model larger.



By clicking through each state, you can now see the different positions saved to “Base State”, “State”, and “State 2”.

Feel free to add more states to your animation as you wish.

In this example, we have the “sun” model in the following states:

- **Base State:** default location, starting point
- **State:** location change, higher location
- **State 2:** scale change, larger model

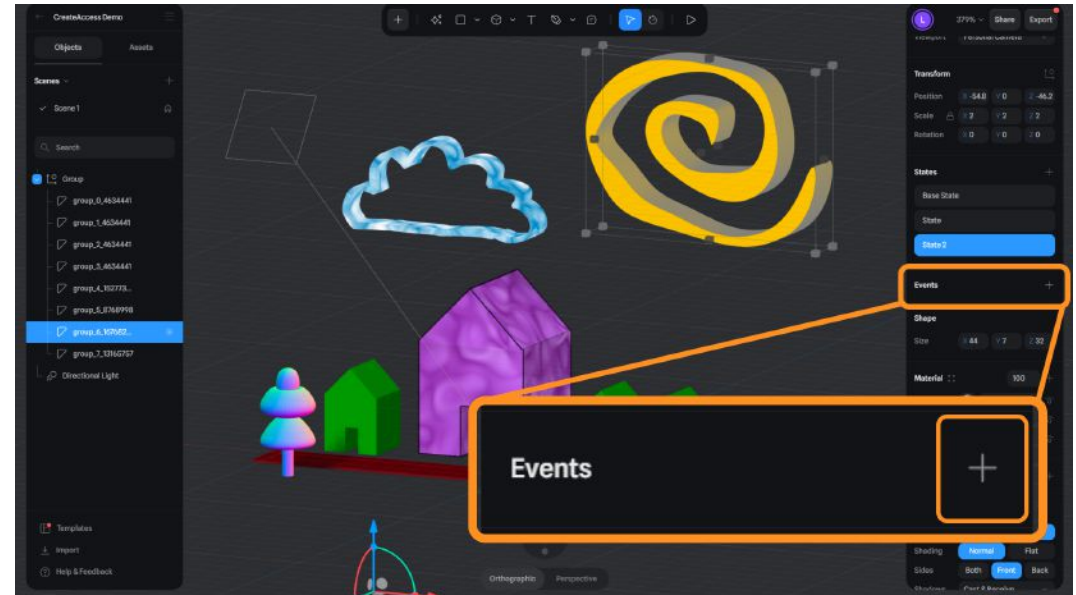
When setup is complete, the model is going to transition smoothly between these 3 States.



ADD EVENTS

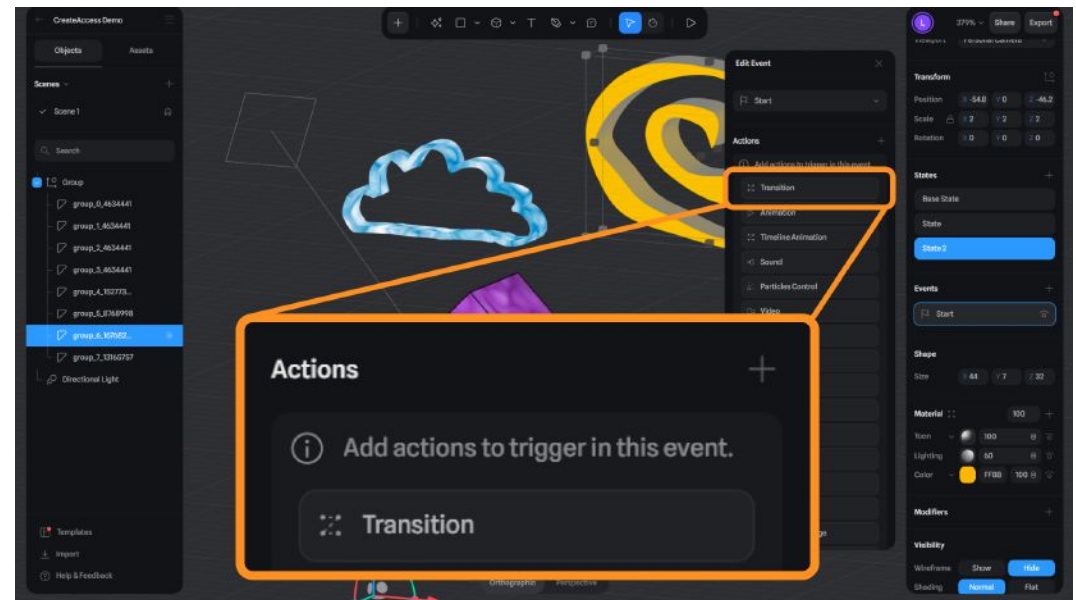
Events help connect your States together to create transitions.

To create an Event, make sure your animated model is selected, and go to the **Events** panel on the right. Click the "+" icon to create a new event.



A new panel will appear for the Event you've created. Under the "Actions" section, select **Transition**.

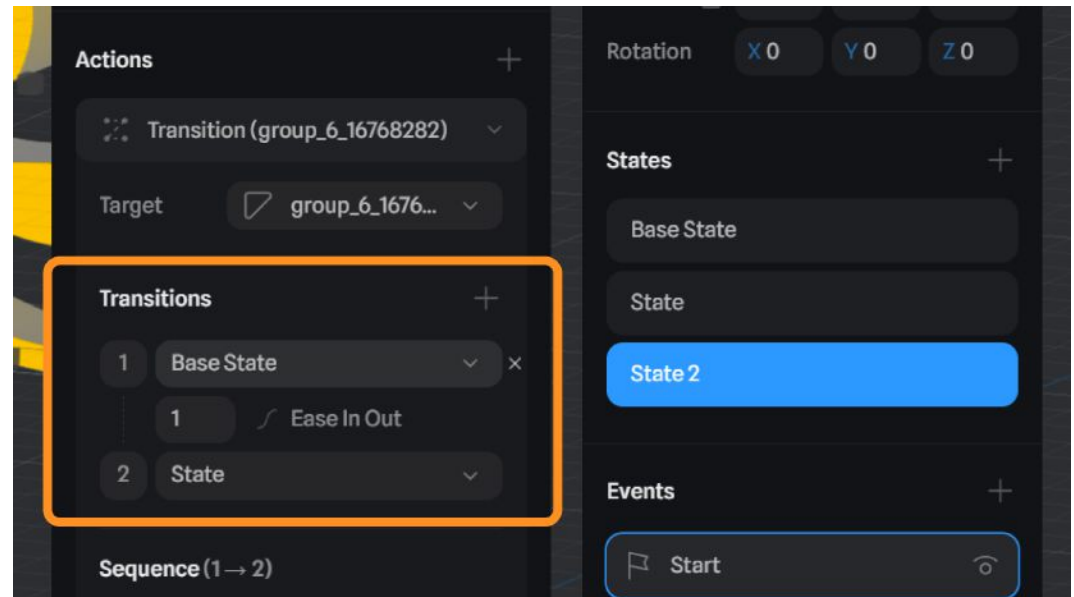
The Transition option allows you to create animations using the States you created.



Click on the **Transitions** tab to open it. It will be populated with 2 dropdowns.

For dropdown 1, select “Base State”.

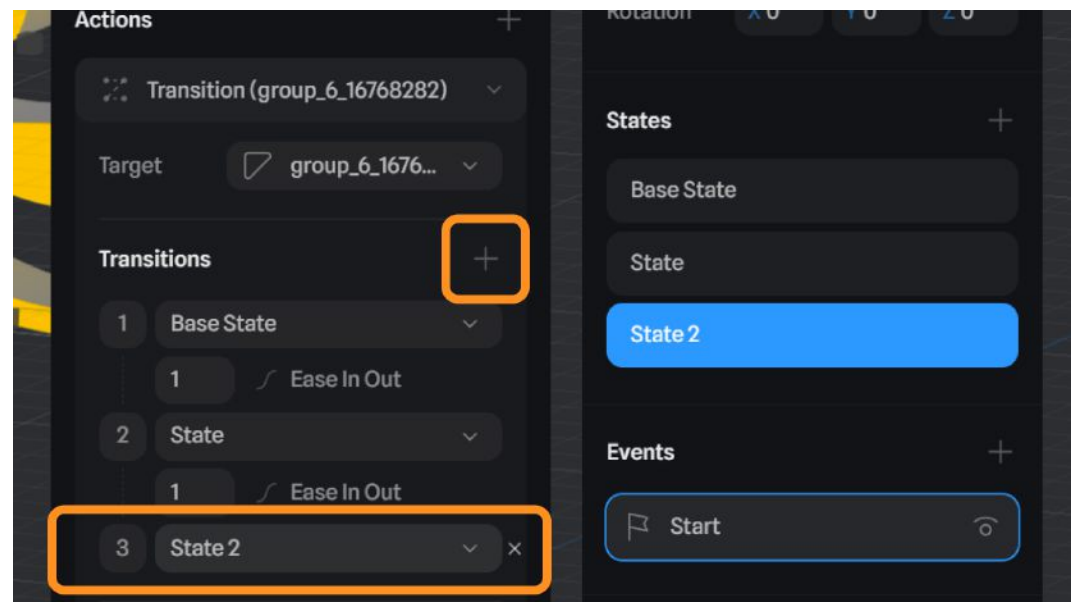
For dropdown 2, select “State”. This is the order of your model’s movement during animation.



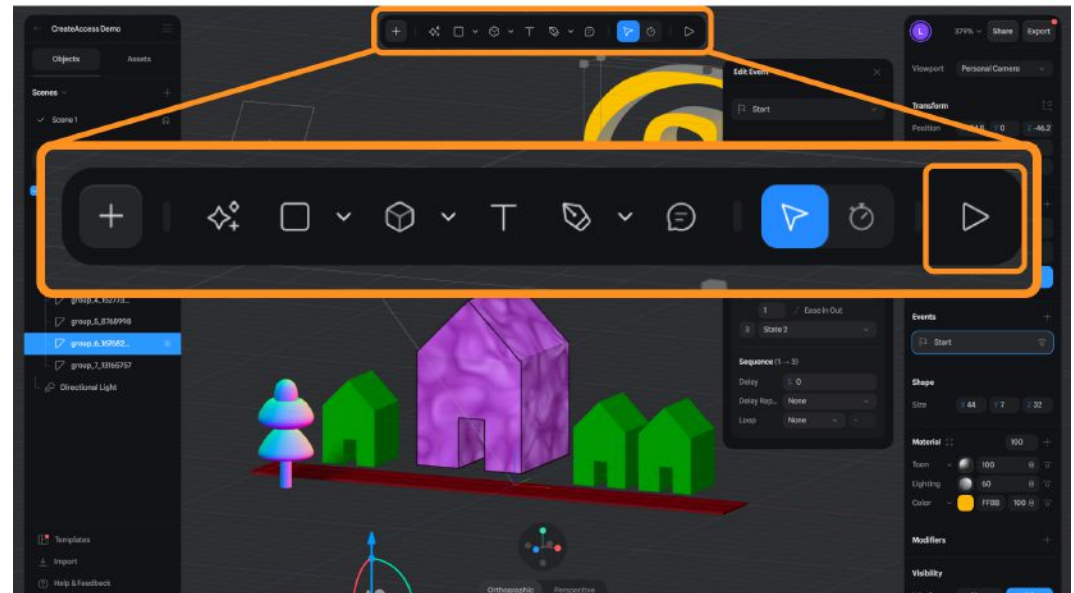
If you have more than 2 states created for your animation, add a new dropdown by clicking the **+ icon** in the Transitions section.

Select “State 2” for the third dropdown.

Repeat this step as needed based on the number of states you’ve created. By selecting the states in a different order from the dropdowns, you can change the order of your animation if desired.



To test your animation, click on the **Play icon** at the top menu. You will see a preview of your Spline project with the animation.



Your animation will play once in the preview. You can still navigate around in the 3D space.

When done testing, click on the **X icon** to close the Play preview window.

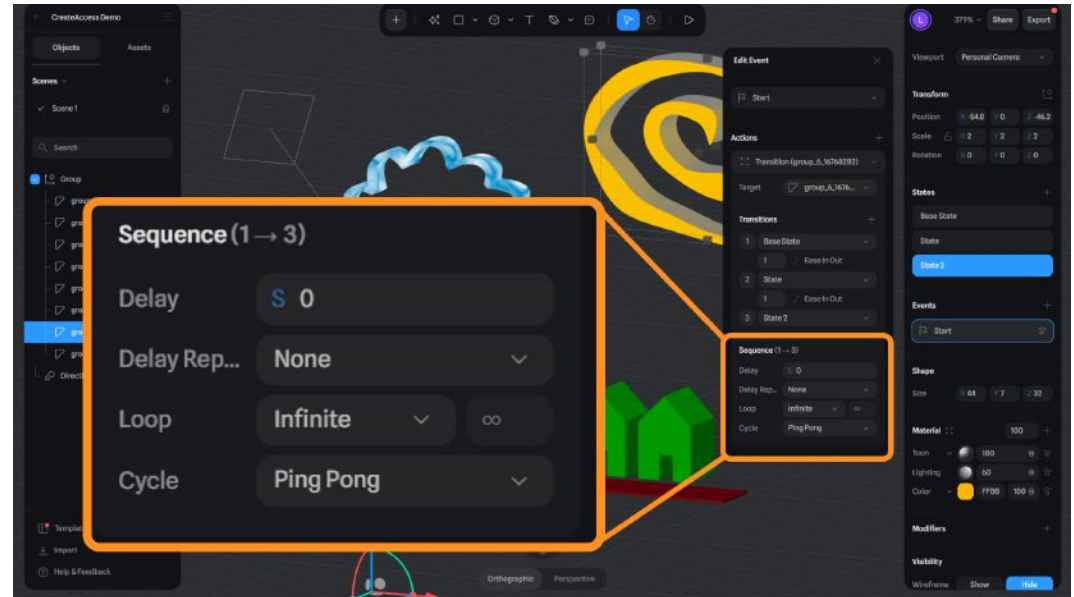


To make your animation loop, instead of playing once, head to the “Sequence” section at the bottom of the event window.

In the **Loop** dropdown, select “Count” for a definite number of loops or “Infinite” for a non-stop cycle.

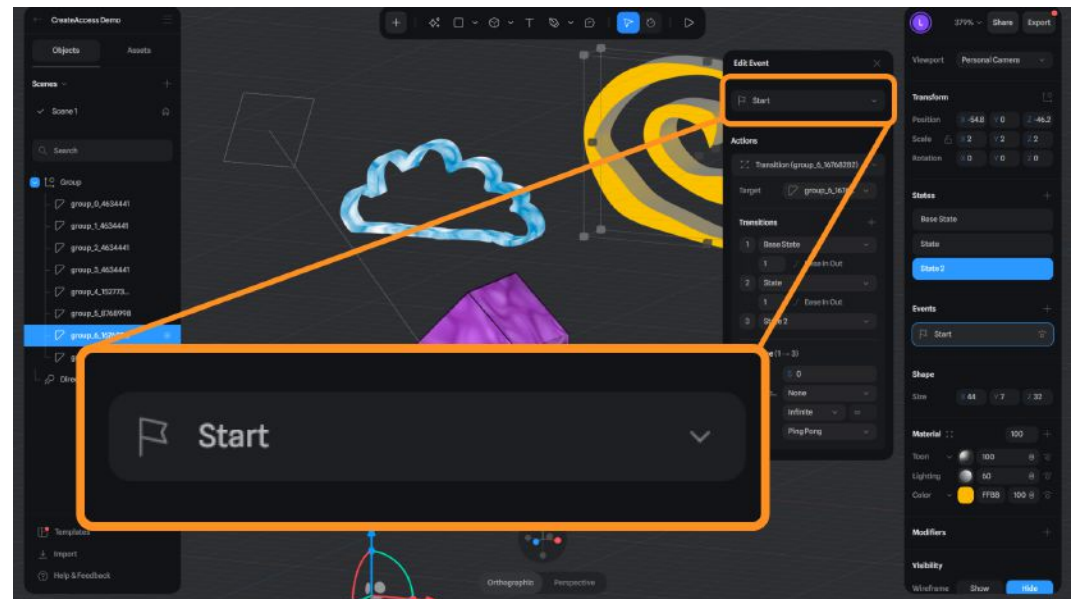
In the **Cycle** dropdown, select “Ping Pong” to make your animation loop back and forth.

Use the **Play icon** again to test your looping animation.



By default, the animations you create will start as soon as the webpage loads (or the Play button is pressed). You can change this and make the animation start based on a specific trigger (mouse movement, keyboard press, etc).

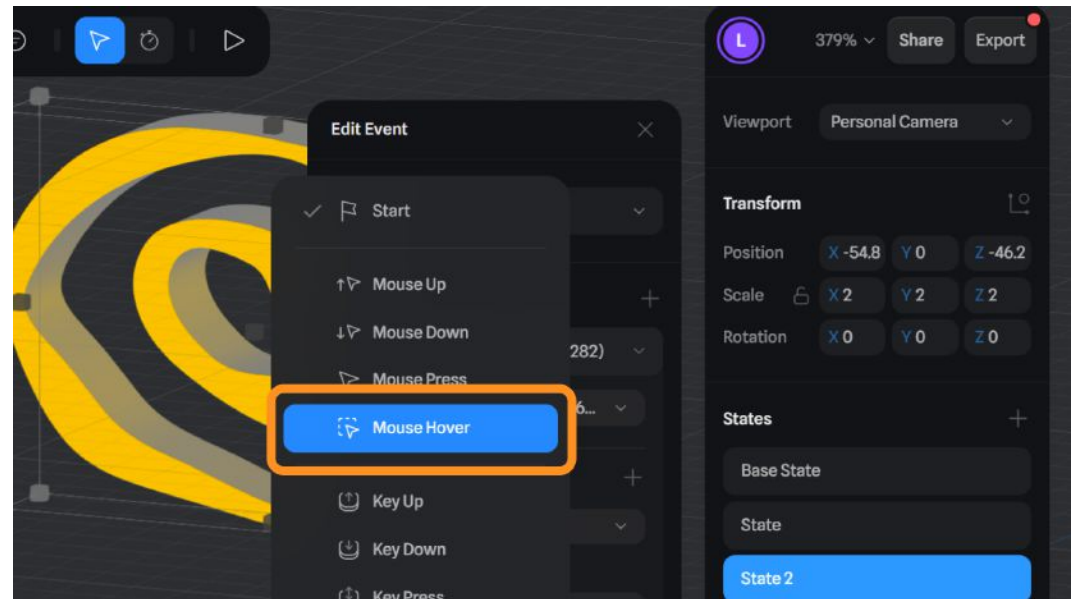
At the top of the Events window, click on the **Start** dropdown and select a different trigger.



For example, **Mouse Hover** will make your animation start only when the viewer's mouse hovers over the animated shape. If the mouse does not move over your shape, the animation will not play.

Choose different triggers and test them by using the **Play icon** at the top menu.

These settings will carry over if you choose to add your Spline project into a different application or website, and can help you create an interactive experience for the viewers.



Self Check

Did you create the states and events that resulted in an animation you liked? Did you add a different trigger to your animation?

Step 5: Experiment with additional features in Spline

Preview

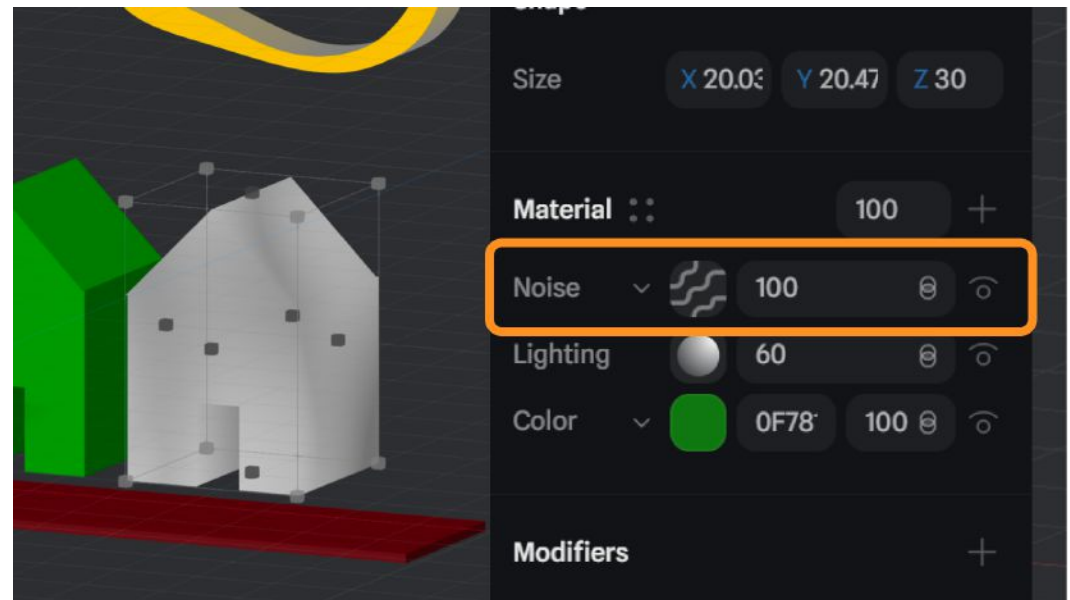
Once you understand the basics of animation in Spline with States and Events, you can use the same concepts to animate other components of your project as well. This section will show you some additional techniques for making dynamic animations in Spline.

Experiment

ANIMATE MATERIALS

In addition to making your whole 3D model move, you can use States to make the materials on the surface of your model move.

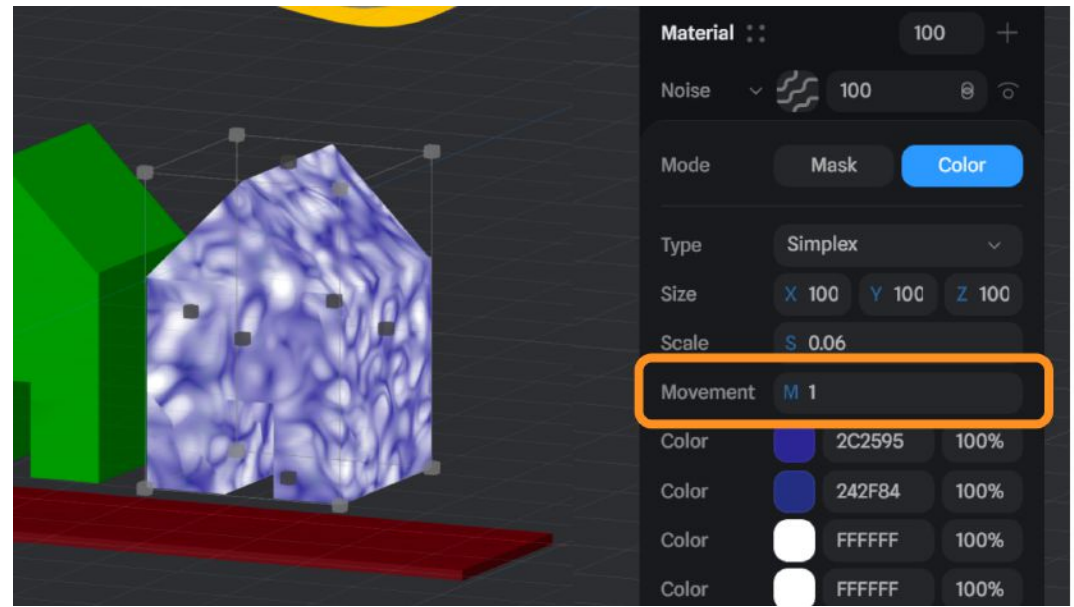
Click and select the model you want to animate the material of. From the Materials panel on the right, add a **Noise** layer.



Set the “noise size” and “color” as desired as learned in the previous sections.

Next, make sure that the **Movement setting** is set to “1”. This setting changes the position of the material layer on your model.

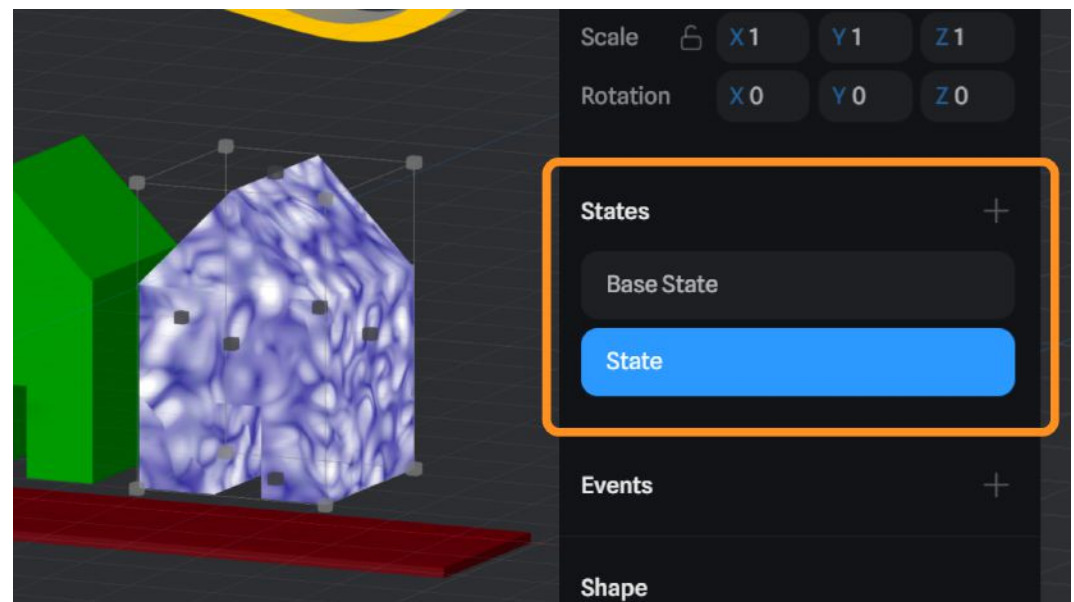
Experiment with the rest of the material settings freely.



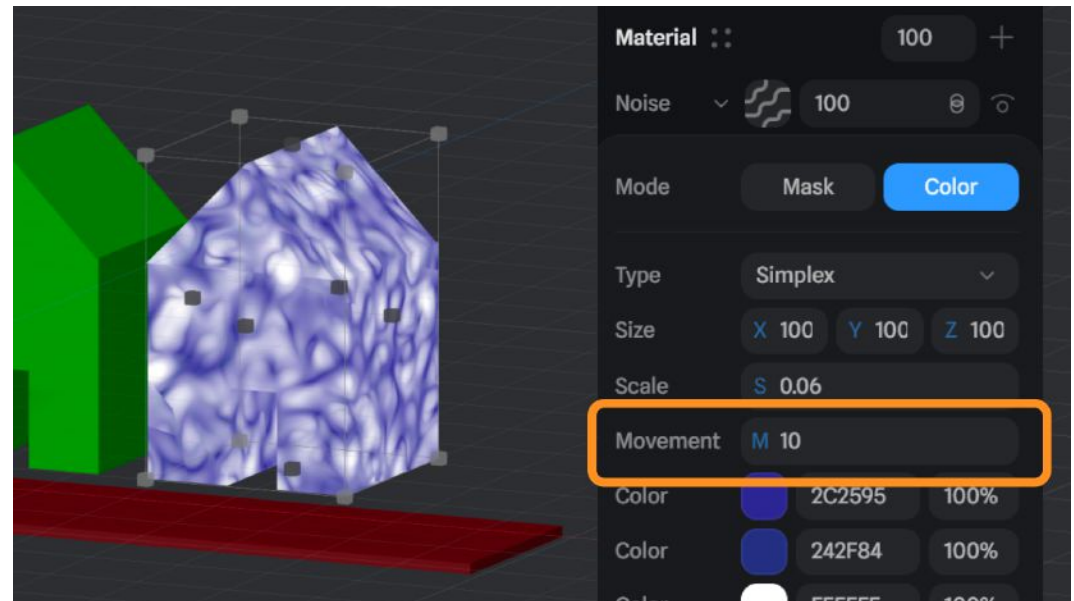
When you’re happy with the material, create **States** for your model.

Select **State** and leave the Base State as-is.

In the same way you can move an object between states, you can move the material on the surface of the object as well.



After selecting **State**, go to the settings for **Noise** material and set the **Movement** setting to “10”.



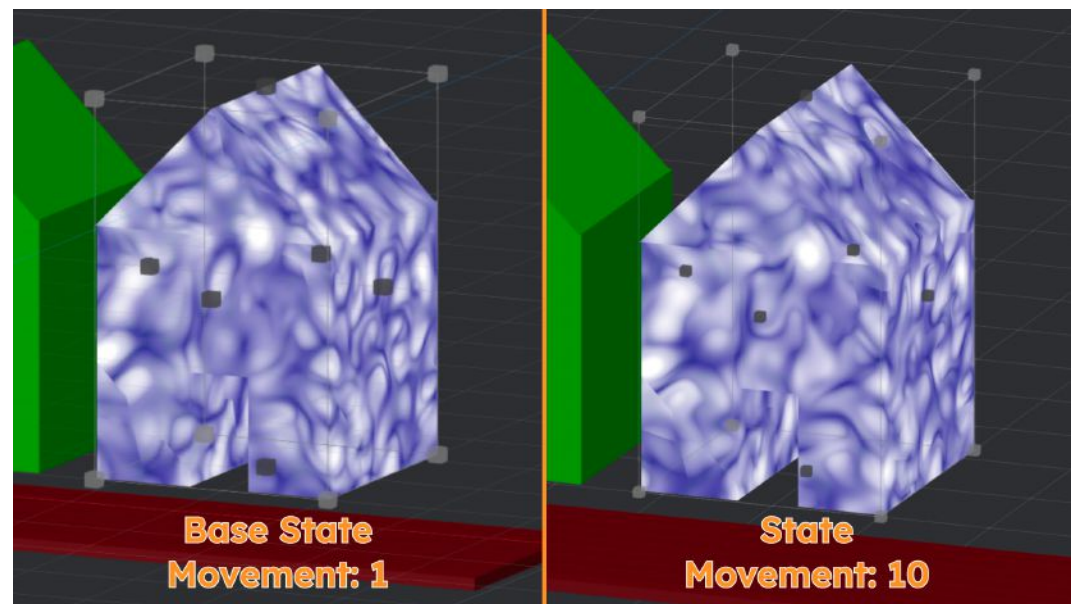
Now, if you click between State and Base State, you should see a difference on the surface material of your model.

What we achieved with this setup is different material “Movement” values at 2 different states.

At the beginning (Base State), the material Movement will have the value of “1”.

At the end (State), the material Movement will have the value of “10”.

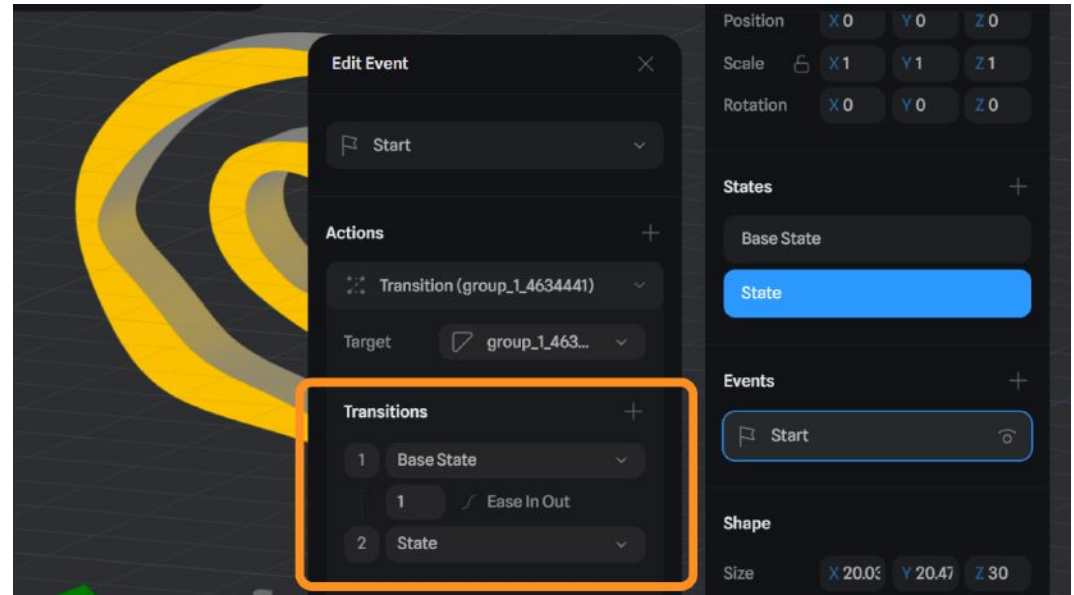
By transitioning between these two States, we will be creating a smooth animation that happens on the surface of the model.



Create an **Event**. Choose the “**Transition**” option and set the first transition to be “Base State” and the second to be “State”. (This is the same setup we used to animate our whole 3D model previously.)

You can set up the loop options to your own preference.

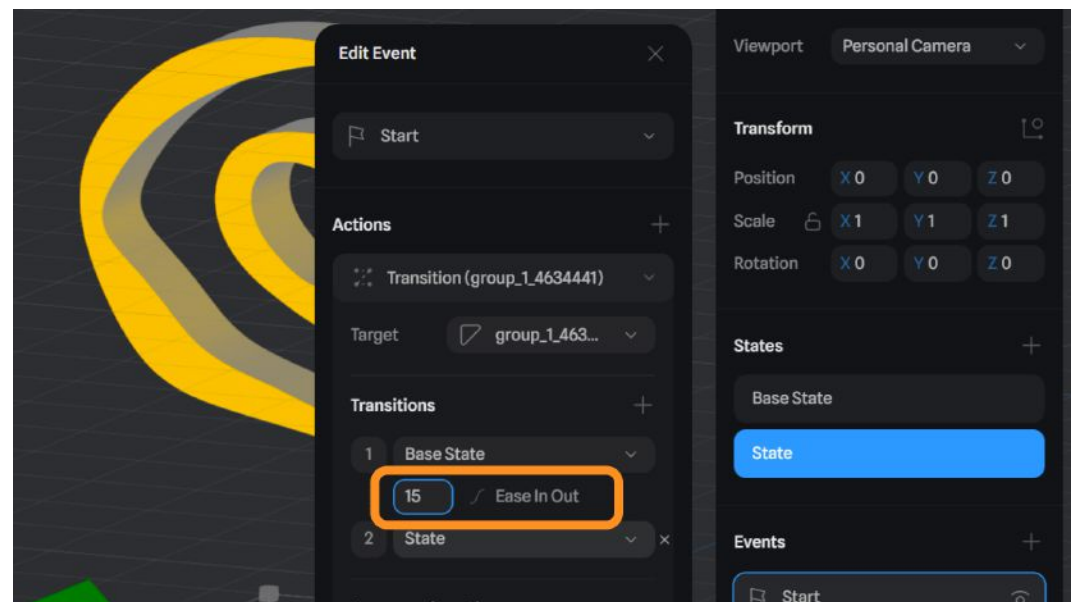
When you press **Play** at the top menu to view your project, you will see the material on your model shift with an animation.



If you notice that the animation is moving too slow or fast, you can edit it within the **Event** settings.

The **number box** between the transitions determines how many **seconds** the transition takes. Change this to a higher number to slow down your animation, or lower number to speed it up.

Press **Play** to test your new animated material.

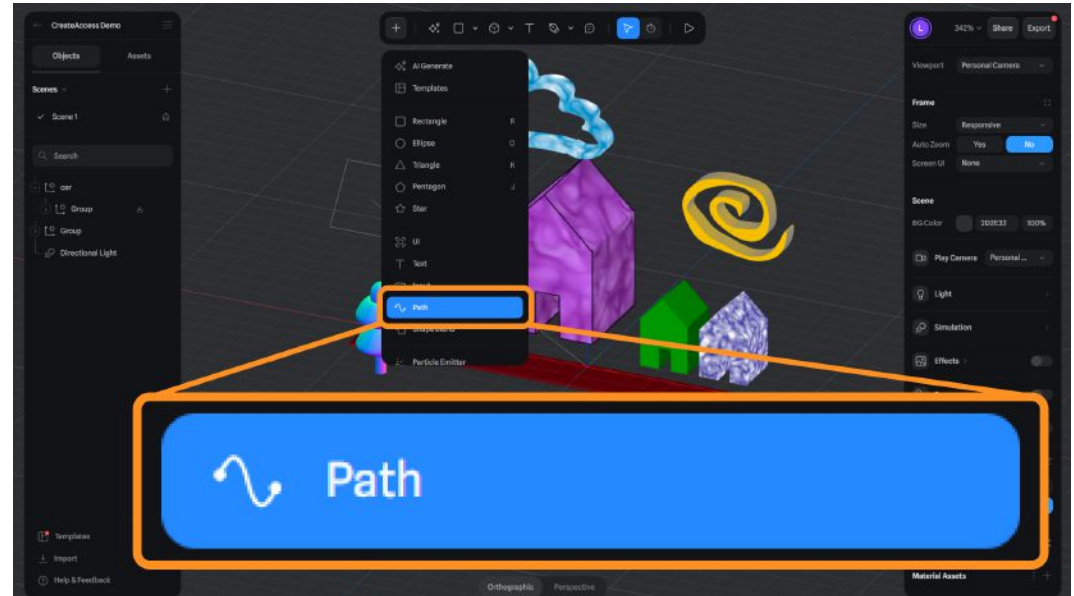


ANIMATE ALONG A PATH

Previously in Step 4, we learned how to animate a model between different states in the 3D space. Using the same animation concepts in Spline, you can also animate a model **along a path**.

Animating along a path gives the creator the opportunity to create smoother and more complex animations. With this method, instead of going from “point A” to “point B”, the model will follow a full path that is created separately.

To start, click the **+** button at the top menu and select **Path** from dropdown.



Click anywhere in the Viewport to start creating a path.

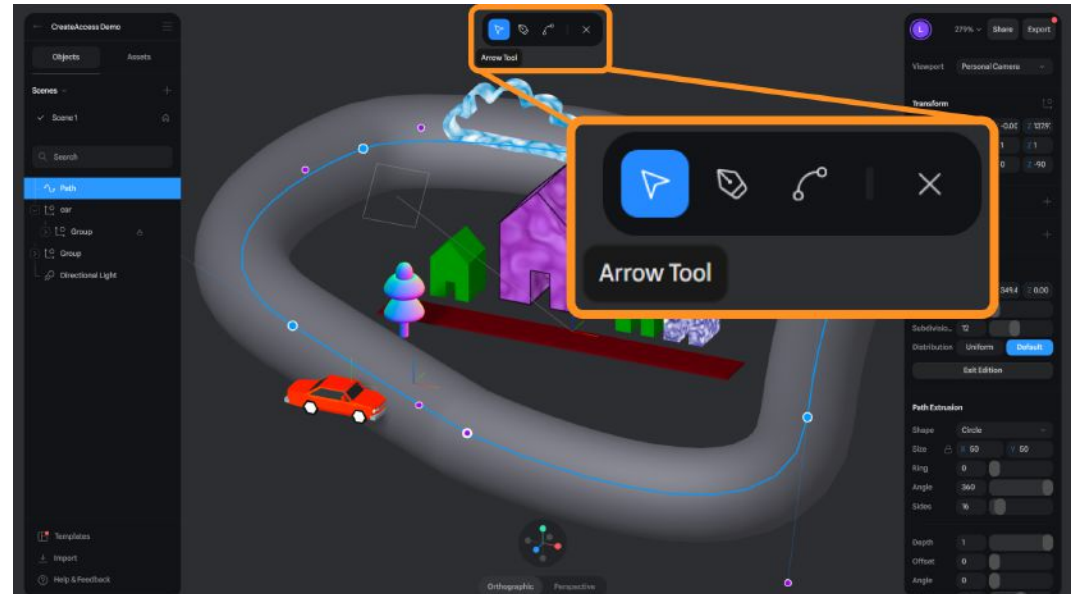
To create rigid lines, keep **clicking** along the Viewport.

To create curved lines, **click and drag** while creating the points.



Use the **Arrow tool** from the top menu to move the points after they've been created.

Or use the **X button** to exit the editor when you're done creating the path.



By default, this tool will create a gray cylinder along the path. For animating, we only need the invisible path, not the cylinder model.

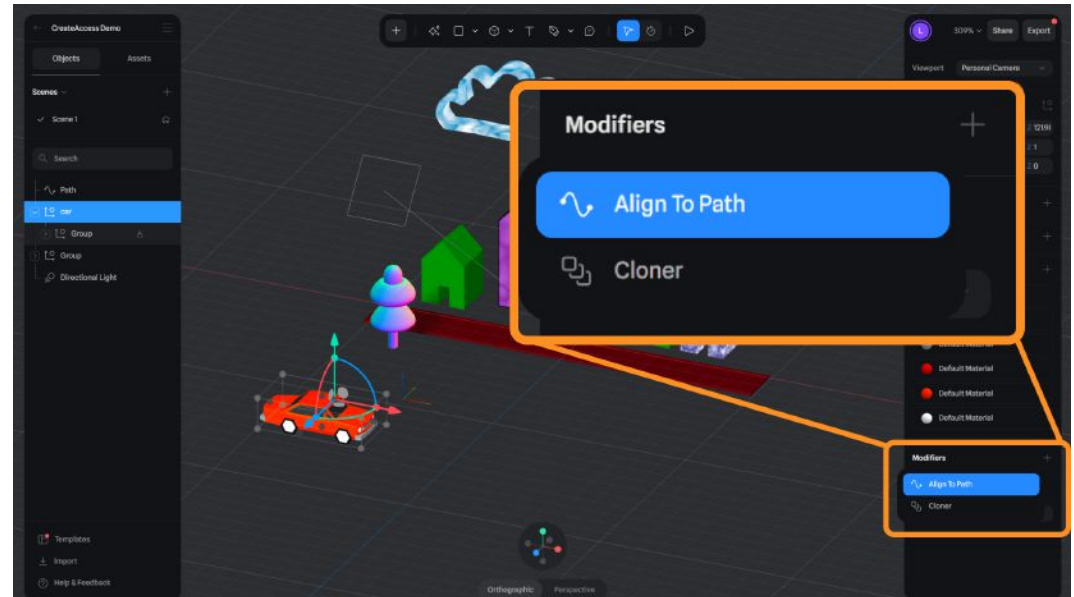
Click on the path you created to make sure it's selected. On the "Materials" panel on the right, **disable** the Light and Color layers with the **eye icon**.

This will make the cylinder invisible, so we can focus on using the path only for our animation.

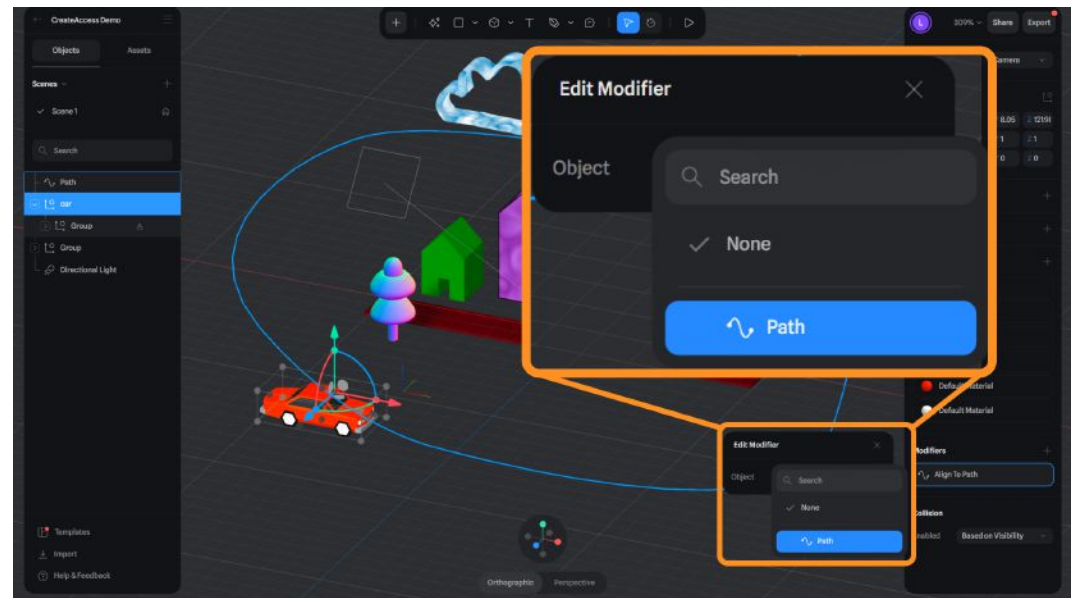


Now, **click and select** the 3D model to move along the path.

Find the **“Modifiers”** section in the right panel and use the + button to add an **Align to Path** modifier.



In the **“Edit Modifier”** window, use the **Object dropdown** and select the **“Path”** you created.



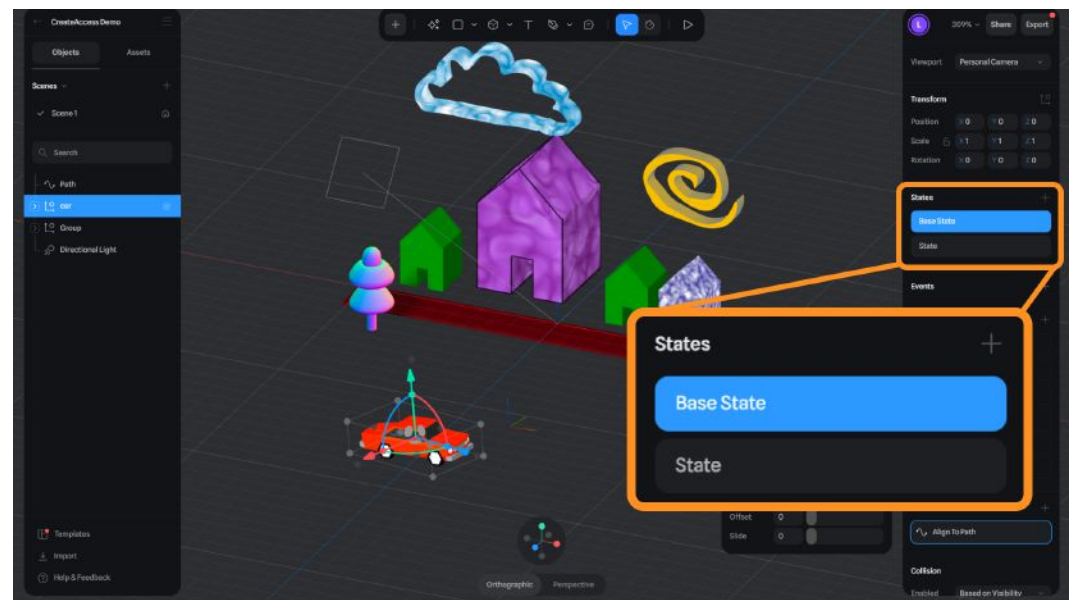
Once the “Path” is selected, your model will automatically move to the beginning of the path.

You will also see additional settings in the Modifier window.



Create a **State** for the model. If a State already exists, you can use the existing one.

Make sure you're set on the **Base State**.



Back in the modifier, find the **Slide** option. Slide will move your object along the path.

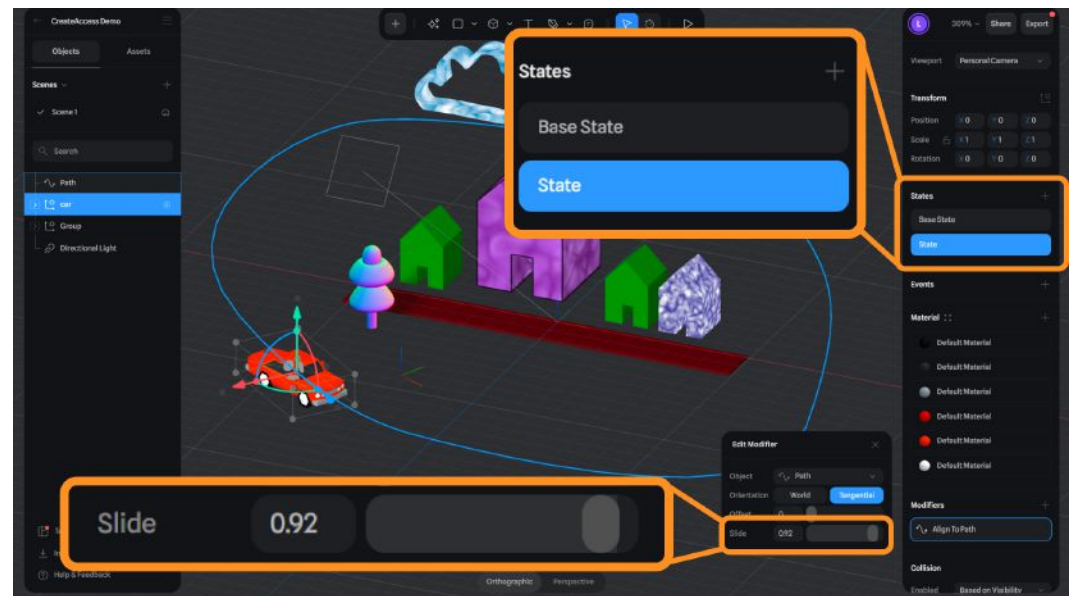
Use one of these sliders to determine where you want your object to **start the animation**.



Now, select the **State** option.

Move the **Slide** slider again to determine where you want your model's **animation to end**.

By moving the slider to a new value and making a change, the State will automatically update.

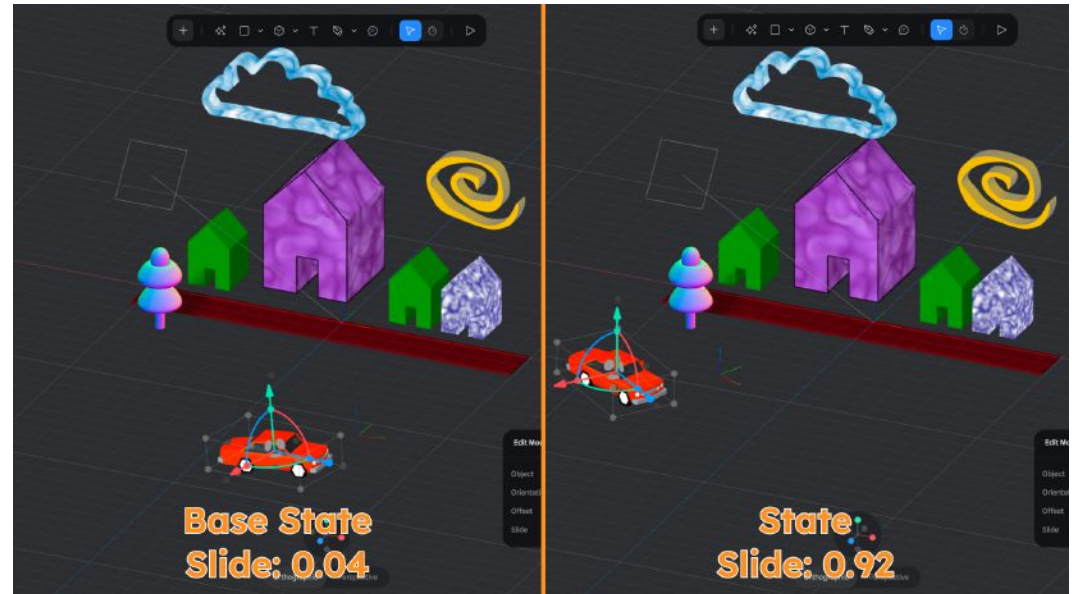


What we achieved with this setup is 2 different locations along the path for our animated model.

At the beginning (Base State), the model is at the start of the path.

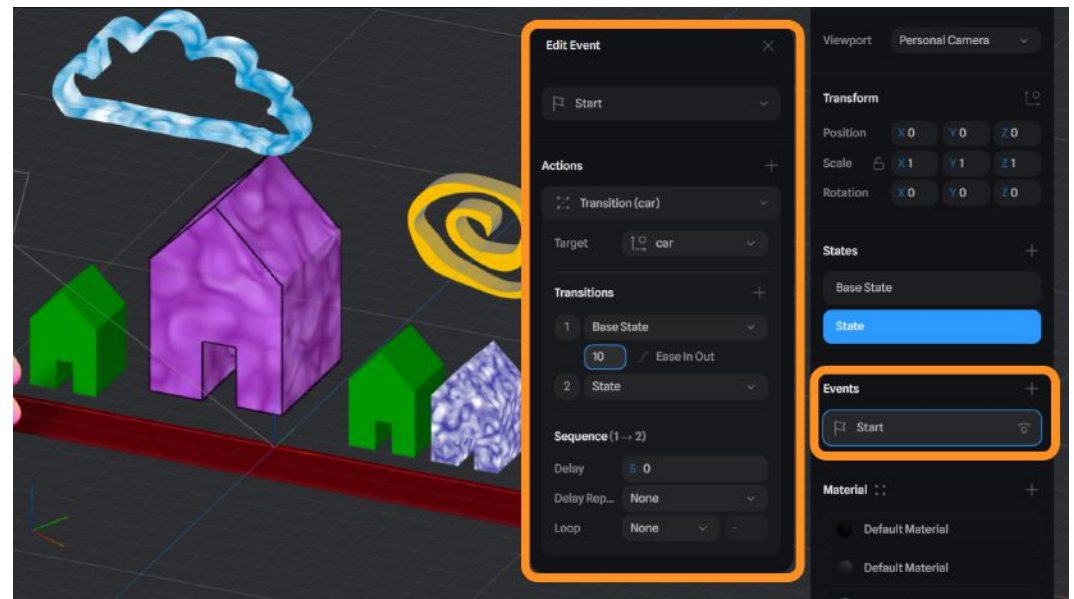
At the end (State), the model is at a different location on the path.

When we create an Event to connect these two states, the model will automatically and smoothly move from the beginning of the path to the end.



Make sure an **Event is set up** as we've learned previously to transition between the States.

When ready, you should see your object move along the path when the project is in **Play mode**.



ADD PARTICLE EFFECTS

Particle effects are 3D systems that are made up of a large number of small objects. They can be used to create effects like smoke, explosions, fireworks, magic effects, and many more that can be customized creatively.

In Spline, you can create particle effects by using the **Particle Emitter** object.

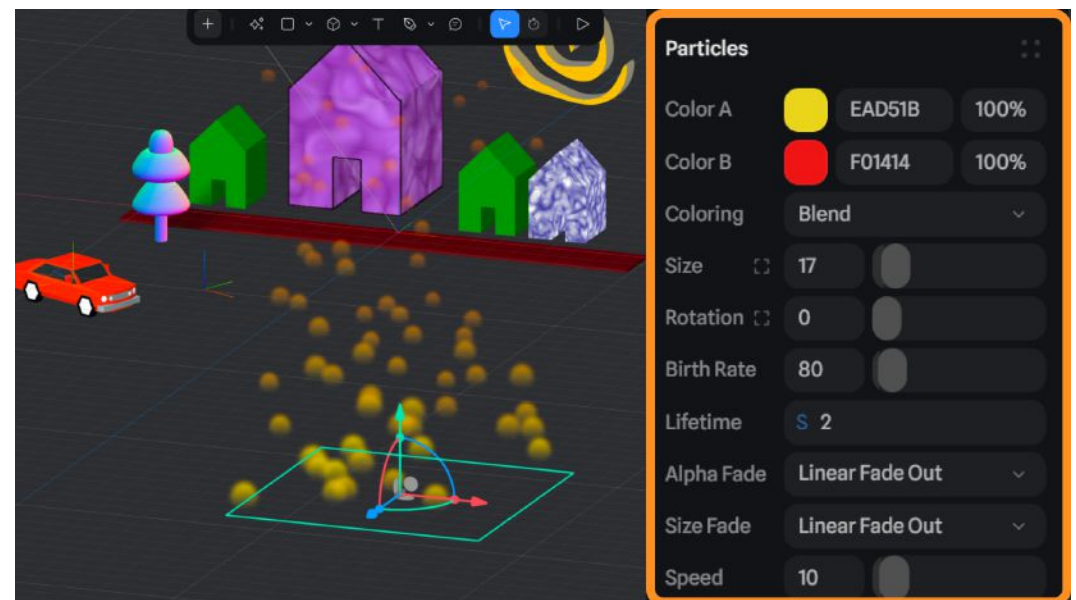
Click the **+** button at the top menu and select **Particle Emitter**. Click anywhere in your Viewport to add the new Emitter.



Use the settings on the right panel to customize the Particle Emitter. You can change the **color**, **speed**, **size** and other properties of particles.

Birth rate determines how many particles are created within a second.

Life time determines how long each particle exists before fading out. The longer this time is, the further the distance the particles will travel.



You can animate the Particle Emitter like any other object within Spline with “States” and “Events”.

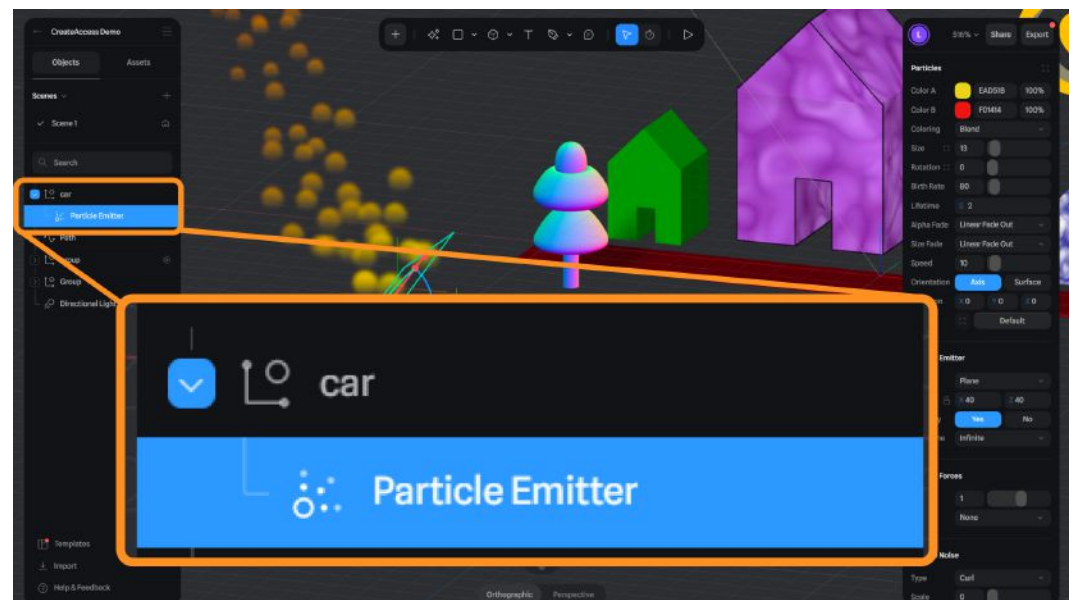
You can also make the Particle Emitter follow an already-animated model in your project.

In the Viewport, position the Emitter in relation to the model you want it to follow. In the example on the right, the Emitter will be following the car and is attached to the back of it.



Then, in the **Outliner** panel on the left, **drag** the Emitter on top of the animated model until it becomes a child and let go when it's attached.

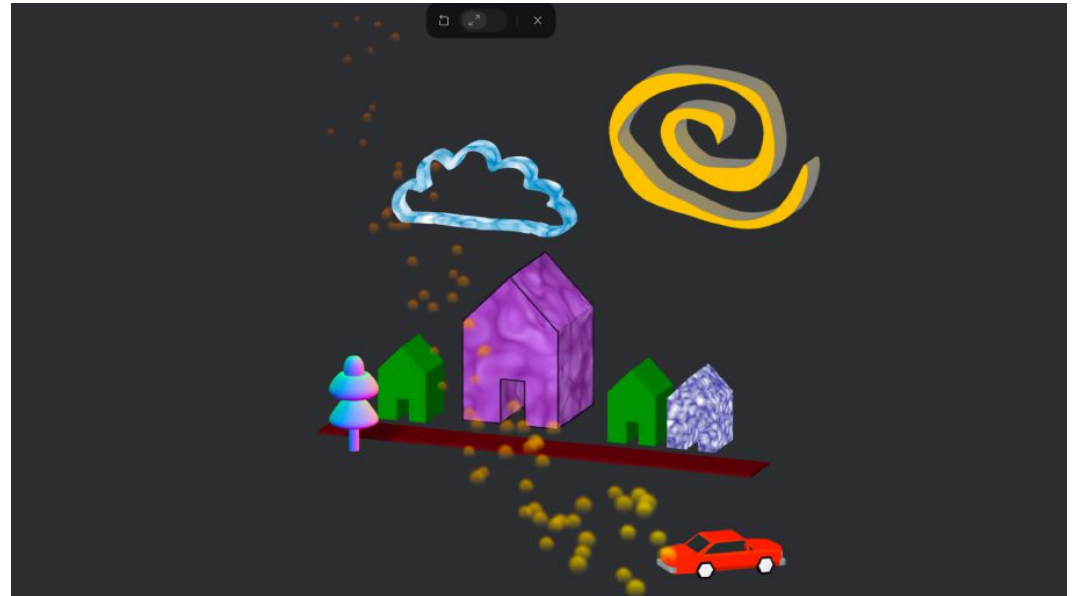
The Emitter should show up **under** the attached object in a **dropdown**.



When an object becomes the “child” of another, it will follow the same movement, rotation, and scale changes made to its “parent”.

In our example, the Emitter (child) will be attached to the animated car model (parent) and follow its movements.

Press **Play** to see the Emitter follow the animation of the “parent” object.



Self Check

Did you find the additional tools helpful? Were you able to create new animations with materials, paths, or particles?

Step 6: Export your project

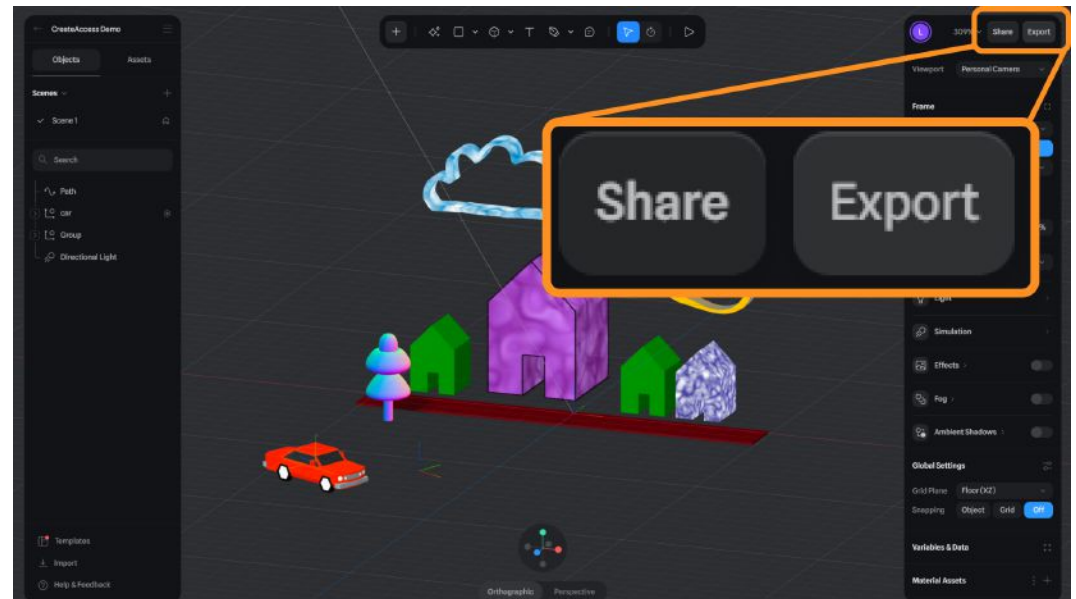
Preview

Once your Spline project is ready, you can export an “embed code” which will enable you to place your project *within* a different website. This section will show you how to export your embed code, as well as how to share your project in Spline with others.

Experiment

EXPORT FOR THE WEB

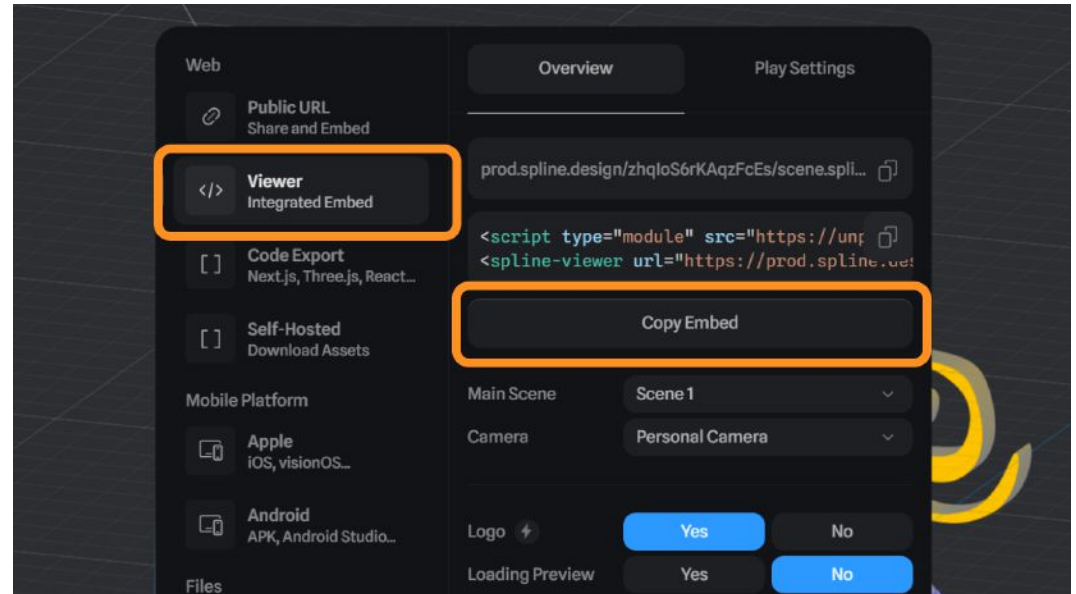
Click the **Export** button from the top-right corner of the window.



Under the **Web** category, select **Viewer** to generate an embed code for your animation.

With this code, you will be able to integrate your Spline project into different websites or other web-based applications.

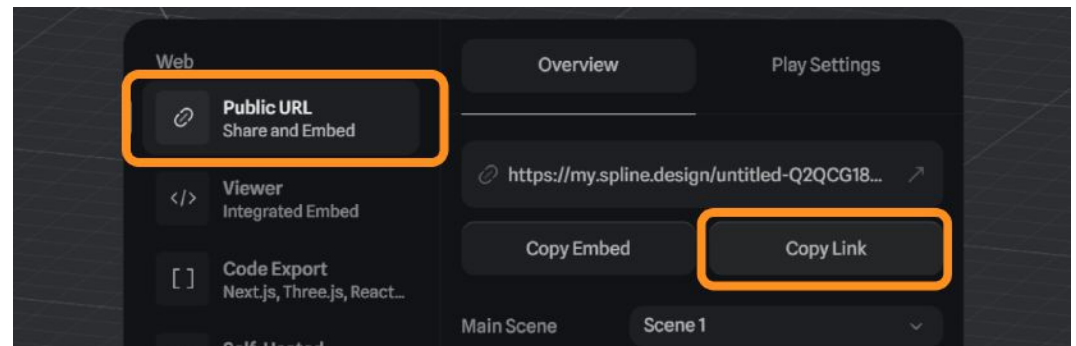
Click on **Copy Embed** and save the code to use in your website or other applications.



If you would like to share your projects with others within Spline's own website, instead of exporting it to a web application, you can also do so from the **Export** settings.

Select the "**Public URL**" option in the Export window and select "**Copy Link**".

This will give you a shareable link of your project. Others who have this link will be able to paste it into their browser and view and interact with your Spline project without needing to create an account.



Self Check

Were you able to find and copy your embed code successfully? Did you try to use a public link of your project and share it with others?

Lesson Closure

Demonstration of Learning

You now know how to bring your own models into a Spline project and add materials to each model. You have a core understanding of how States and Events contribute to creating animations in Spline and how to make them more interactive by adding custom triggers based on user actions. You also learned new techniques within Spline to bring your project to the next level, and share it with others through embed code and public links.

Exploration Opportunities

You can use the embed code generated from Spline in a variety of other web applications. If you're interested in learning how to use the embed code in a personal website of your own, check out the following lesson:

[Create a Website with 3D Animations in Google Sites](#)