Creating virtual scenes with A-Frame

A-Frame Course I

Section 4

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CREATING VIRTUAL SCENCES WITH A-FRAME | A-FRAME COURSE I

In this course you will learn about A-Frame, an HTML-based framework that allows you to create Virtual Reality scenes and immersive web environments using the tool's own tags and components.

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Section 4

A-Frame. Advanced elements

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SECTION OBJECTIVES

- Knowing advanced a-frame elements
- Knowing the a-frame entities
- Adding these elements into a virtual environment

Section points

1. 2. 3.

Section points

Click on each of the points to find out what we will be studying in this module.

1. Advanced elements

In addition to adding basic geometries to our scene, we have the possibility of adding other elements such as images, videos, 3D objects and audio, among the most common ones.

1. 1. Image

To add an image to a virtual scene, we use the following line of code:

```
<a-image src="url"></a-image>
```

The simplest way to add an image is to use this line of code and call scene an image with an external url.
However, in the practical exercise we will see the option of how to add an image hosted in our Glitch project.

We have to take into account the dimensions of the image to include them in our line of code!!!!

By default, if we do not add the width and height attributes, they will get a value of 1. If, for example, we add an image with a 16:9 aspect ratio, the line of code will have to be as follows:

```
<a-image src="url" width="16" height="9"></a-image>
```

To find the documentation on how to add images to our a-frame scene, we can google "**a-frame image**" and we will find on the first website the basic line of code to add the image as we have been doing during the course.

On the other hand, if we want to add a 4:3 image, the line of code will be:

```
<a-image src="url" width="4" height="3"></a-image>
```

We also have to take into account the scale attribute. If the image is too big or too small when we see it in the scene, we will have to work with the scale attribute. For example, if we want to halve our image, the line of code would be:

```
<a-image src="url" width="16" height="9" scale="0.5 0.5"></a-image>
```

As we see how the image looks on stage, we will play with these attributes to obtain the desired result.

To place the image in the scene, it is necessary to work with the position attribute as we have already seen in the previous modules.

Finally, we have to take into account the **rotation** attribute. If, for example, we want to add an image on the left wall, we will have to work with the rotation attribute as follows:

```
<a-image src="url" width="16" height="9" scale="0.5 0.5" rotation="0 90 0"></a-image>
```

The following example shows a scene with an image on the back wall and one on the left wall:

SCENE WITH IMAGES

Check the scene code here:

1. 2. Audio

To add audio to the scene, the following line of code is used:

```
<a-audio src="url"></a-audio>
```

If we want the audio to play automatically, we need to add the autoplay attribute and set it to true:

```
<a-audio src="url" autoplay="true"></a-audio>
```

1. 3. Video

In much the same way as adding an image, you can add videos. The basic line of code is:

```
<a-video src="url" width="16" height="9"></a-video>
```

Just like adding an image, we have to take into account the dimensions of the videos (usually 16:9). We will add these values in the **width** and **height** attributes.

We will also work with the attributes position, rotation and scale to place our video in the scene in the desired position.

In the following example, you can see a video integrated into the scene on the right wall:

```
<!--Video en la pared derecha-->
    <a-assets>
    <video id="videoyt" autoplay="true" src="https://www.youtube.com/watch?v=LrshnxYuzNI"></video>
    </a-assets>
   <a-video id="video" src="#videoyt" width="16" height="9" position="16.92 1.5 0" rotation="0 0 0"></a-video>
```

1. 4. Light

You can modify and add points of light in a virtual scene. To do this, we will use the **<a-light>** tag:

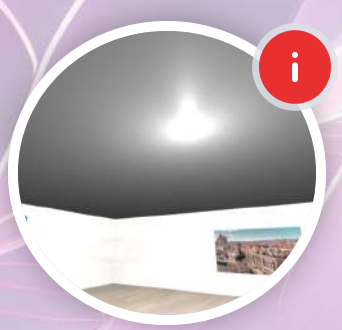
The attributes we can work with in this element are:

- **Type**: we can choose ambient light or a point of light
- **Color**: we can choose the colour of the light
- **Position**: if we want to add a point of light (point), we can place it in any position we want in the virtual scene. We can add as many points of light as we want.

```
<a-light type="point" color="blue" position="0 2.9 0"></a-light>
```

Room with a blue atmosphere

Room with a red atmosphere



Room with one light point

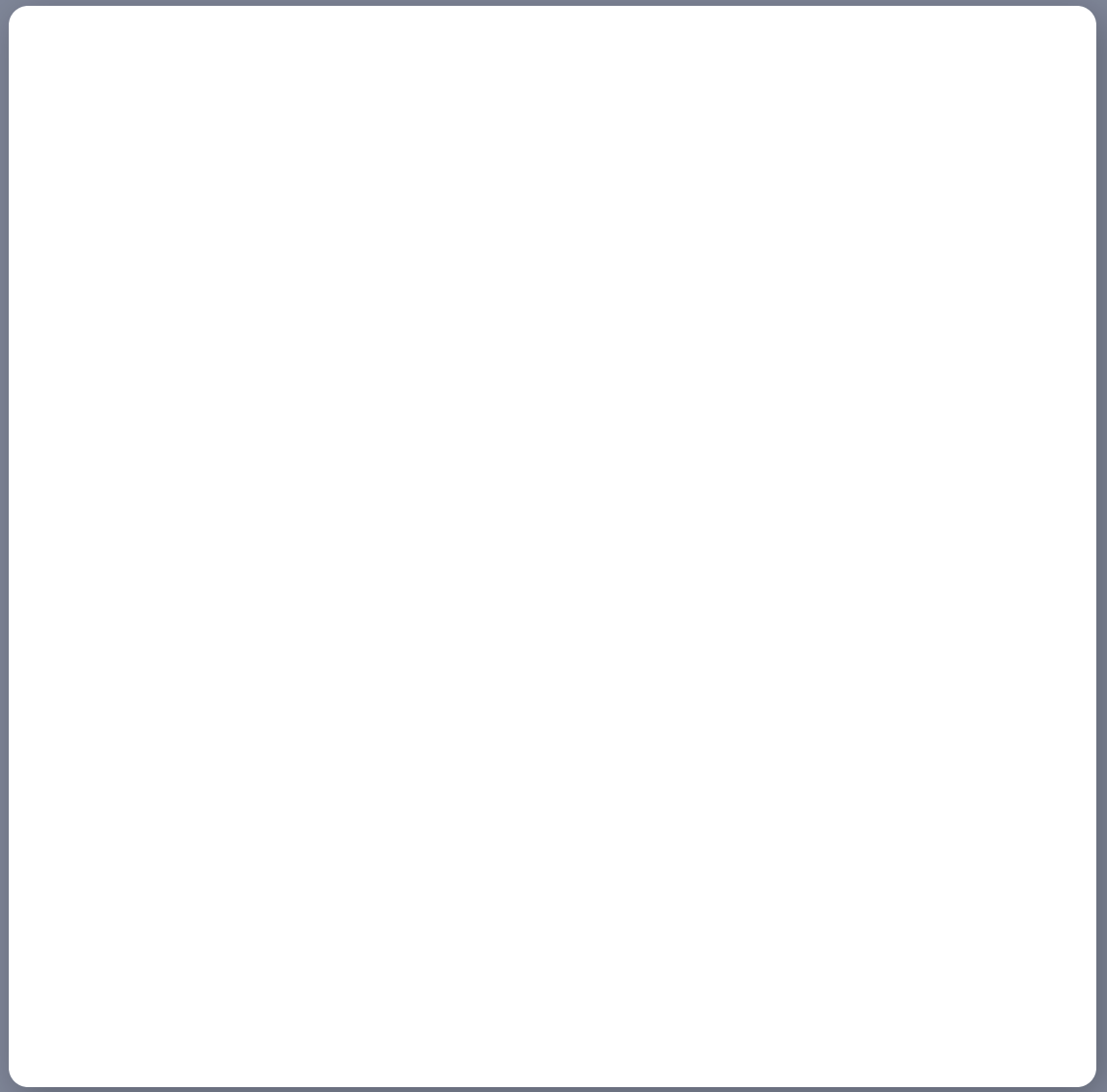
The line of code for the light in this scene is:

```
<a-light type="point" color="#FFFFFF" position="0 2.8 0" intensity="2"></a-light>
```

To find the documentation regarding light, we can google "**light a-frame**" and the first web page will show us the necessary documentation to add light and work with the attributes and values that a-frame offers.

The line of code for the light in this scene is:

```
<a-light type="ambient" color="#DC143C" position="0 2.8 0" intensity="2"></a-light>
```



Code line for the light in this scene is:

```
<a-light type="ambient" color="#00A9FF" position="0 2.8 0" intensity="2"></a-light>
```

1.5. Text

To add text to our scene we do it with the following line of code:

```
<a-text value="Mi texto"  color="#FFF" position="0 0 0"></a-text>
```

It is possible to change the font, size and position of the text in the scene.

In addition, it is also possible to add more elaborate text posters using images.

It is recommended to add posters in the form of images to add text. They offer more options.

2. Advanced elements. Entities (a-entity)

We came across a new concept in A-Frame that represents objects in the scene, it is the concept of **entity (<a-entity>)**.

So far, we have been working with single labels (a-box, a-sphere...), but there is the possibility to include these geometries with the entity label. *However, we have not done this because it is easier to do it the way we have seen in the previous modules.*

However, in order to integrate certain objects, it is necessary to make use of these entities, as explained below:

To add a basic box, we have worked during the course with the following line of code:

```
<!-- Basic box. -->
<a-box color="tomato" depth="2" height="4" width="0.5"></a-box>
```

However, we can add the same box with the <a-entity> tag:

```
<!-- Basic box a-entity. -->
<a-entity geometry="primitive:box" material="color:tomato" ></a-entity>
```

Note that new attributes have to be added when using the a-entity tag. Although it can be done this way, this option is not recommended for adding basic geometries.

2.1. 3D Objects

One of the main elements to add in a virtual scene are 3D objects, both animated and non-animated. To include these elements, we have to use the <a-entity> tag:

```
<a-entity gltf-model="url" ></a-entity>
```

It is necessary to add the gltf-model attribute and attribute to it the value of the external **url** (as is done with the src attribute) where the 3D object is hosted. To place the object in the scene, we have to take into account the **position**, **scale** and **rotation** attributes.

In this case we are going to work with the **.glb** extension as it is the simplest option. Other 3D object extensions are .gltf or .obj.

However, it is not recommended to work with the .gltf and .obj extensions because, unlike the .glb extension, it is necessary to add more than one file (object, textures...) for a correct visualisation. On the other hand, when working with the .glb extension, we will simply work with a single file, so it will be easier to integrate it into the scene.

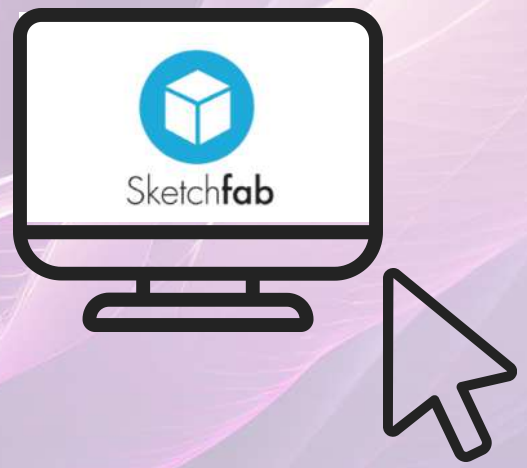
Note that even if we add a .glb object, the attribute we are going to add in the entity tag is gltf-model.

3D Resources

To obtain 3D objects, you can make use of resource banks such as **Sketchfab**.

On this platform you will find both free objects and paid objects.

For the practical exercise of this module we will use free models.



If the 3D object to be embedded has animation, it is necessary to add the **animation-mixer** attribute to the line of code.

```
<a-entity gltf-model="url" animation-mixer></a-entity>
```

In the practical part we will see how to load the 3D object from the Glitch page.

Exercise

Integration of elements in the virtual museum-room

In this exercise we will add elements to the room in the form of images and 3D objects for the recreation of a virtual museum.

During the course we will be designing step by step, in the practical exercises of each module, a virtual museum room.

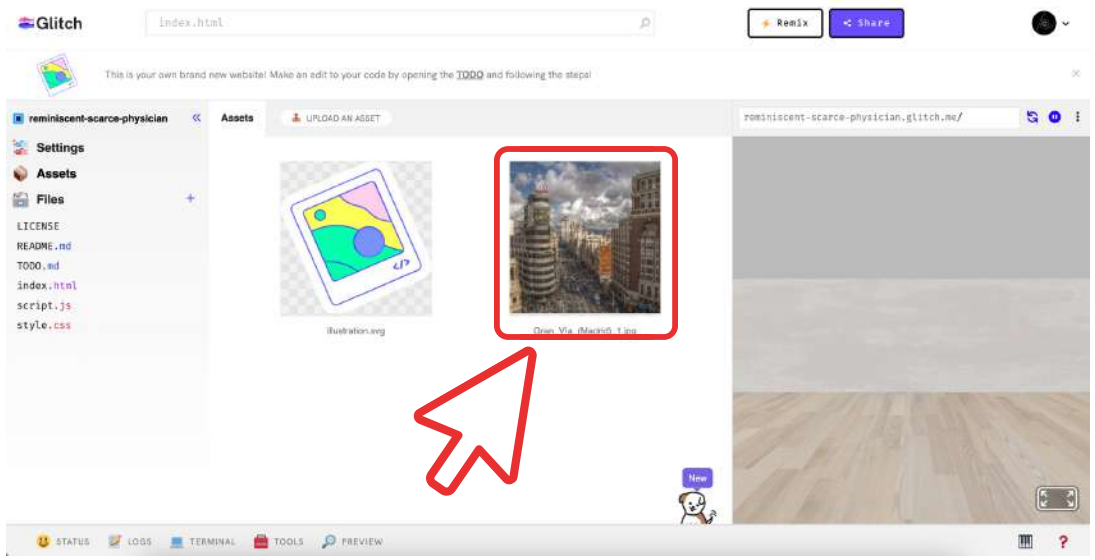
Add Assets in Glitch

We are going to continue with the project of creating a virtual museum-room. To do so, we are going to recover the code from the previous exercise:

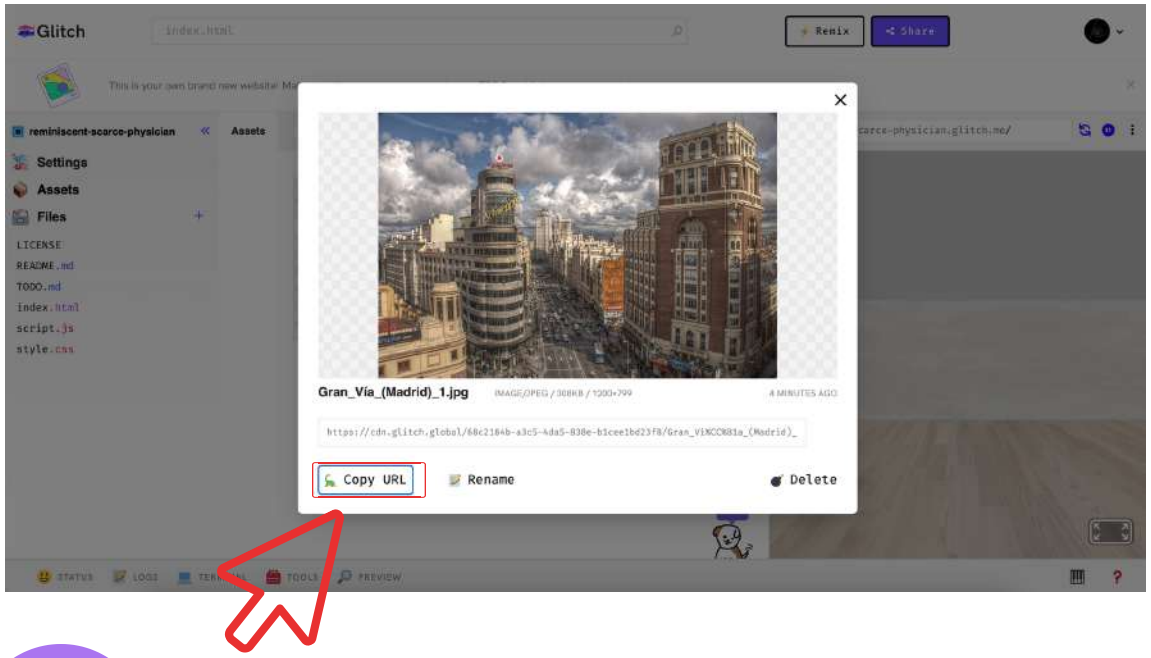
1. Previous code
2. Access to assets
3. Assets tab
4. Load elements
5. Adding elements to the scene

Download the example image and try adding it to your scene.

To load an element we drag it from our computer and it will appear as follows:

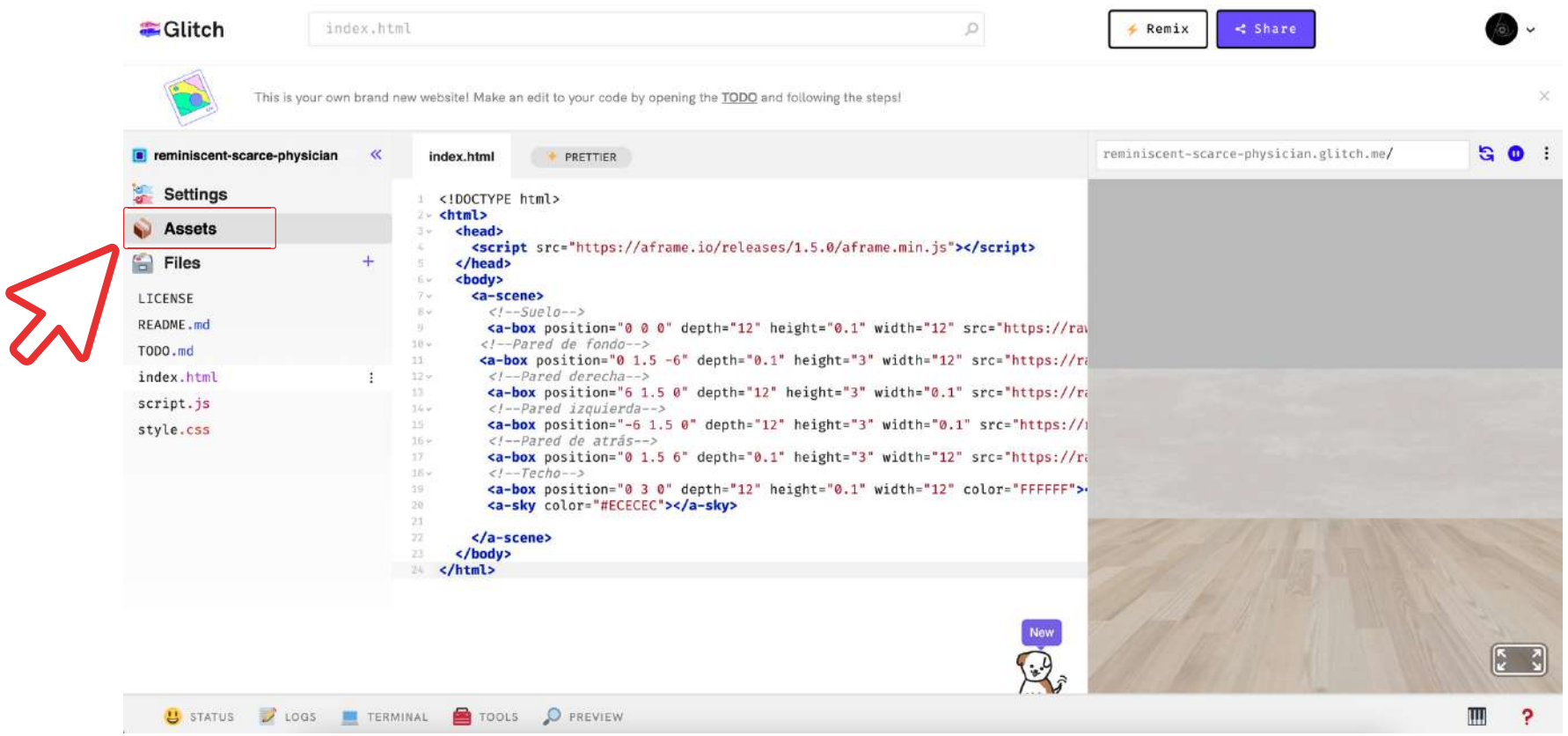


1 Here we see all the elements loaded



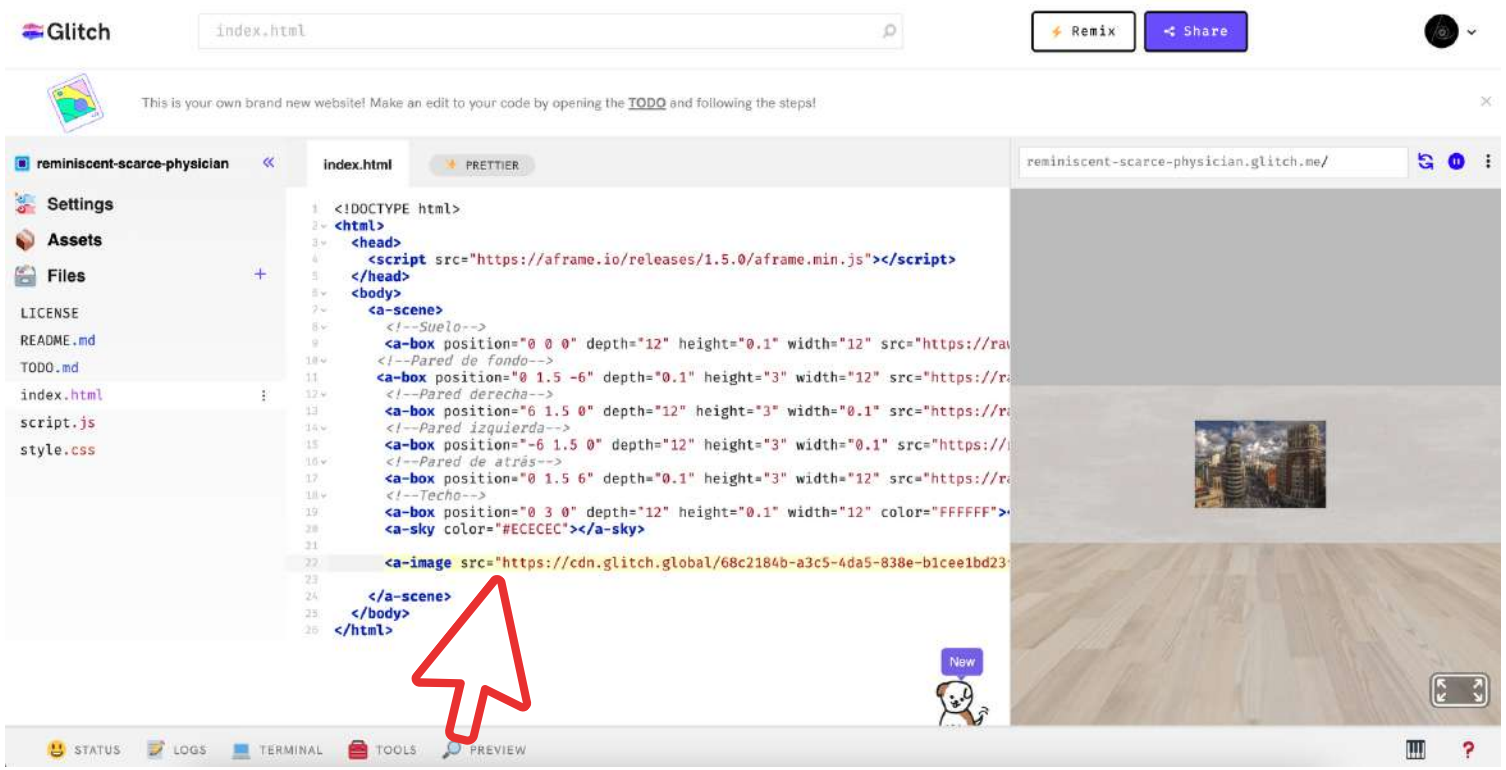
2 When we click on the element, we have to copy the URL to add it to our scene

To load all the elements (images, audio, 3D objects...) we will do it from the Assets tab:



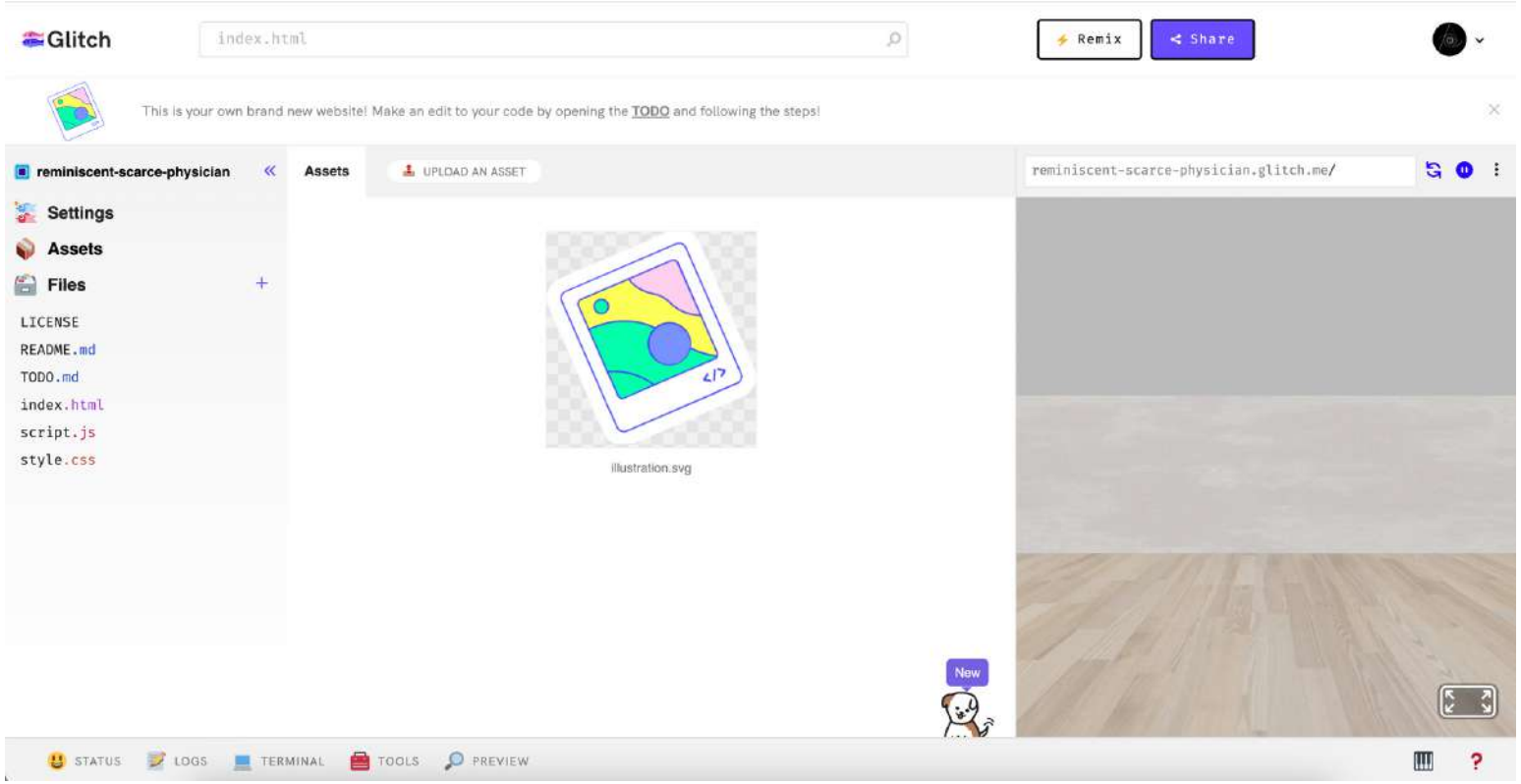
Once we have copied the URL, we paste it as a value in the src attribute of the element we want to add to display it.

In this case, it is an image:




```
<a-image src="url" position="0 1.5 -5.9" width="2.4" height="1.6"></a-image>
```

In this tab we will drag our elements:



Click on the following link to retrieve the code of the practical exercise of the previous module to add elements to the virtual room already created:

Add images to the scene

1. Images resources
2. Position the images
3. Rotate images
4. Sizes the images
5. Final Results

Access to the code of the final scene with the integrated images

To view the images correctly without deformation we have to size the images with the attributes width and height:

To know what values to put we have to look at the dimensions of the image and put proportional values:

```
<!--Imagen 1 en la pared del fondo-->
<a-image src="url" position="0 1.5 -5.9" width="4.8" height="3.2"></a-box>
```

The dimensions of this image are 1200x799. Thus, proportional values are added to scale the image correctly (in this case, the dimensions are divided by 250).

```
<!--Imagen 2 en la pared izquierda-->
<a-image src="url" position="-5.9 1.5 0" rotation="0 90 0" width="4" height="2.66"></a-image>
```

This image is 800x533. (Dimensions are divided by 200).

```
<!--Imagen 3 en la pared derecha-->
<a-image src="url" position="5.9 1.5 0" rotation="0 90 0" width="3.4" height="2.56"></a-image>
```

The dimensions of image 3 are 1706x1280. To set the values, these dimensions are divided by 500.

To position the images correctly on the side walls, it is necessary to rotate them. To do this, we add the rotation attribute and rotate the images on the Y axis by 90 degrees:

```
<!--Imagen 2 en la pared izquierda-->
<a-image src="url" position="-5.9 1.5 0" rotation="0 90 0"></a-image>

<!--Imagen 3 en la pared derecha-->
<a-image src="url" position="5.9 1.5 0" rotation="0 90 0"></a-image>
```

Image 1 on the back wall does not need to be rotated to position it correctly.

Copy and paste the link to the following images or download them to your own computer and then upload them to Assets:

Resource 1

Resource 2

Resource 3

We will position the images on 3 different walls:

```
<!--Imagen 1 en la pared del fondo-->
<a-image src="url" position="0 1.5 -5.9"></a-box>
```

The first image goes on the back wall. To do this we move it up 1.5 in the Y axis from the initial position (0 0 0) and move it away to -5.9 in the Z axis (the wall is located at -6 from the initial position).

```
<!--Imagen 2 en la pared izquierda-->
<a-image src="url" position="-5.9 1.5 0"></a-image>
```

In this case we raise the image 1.5 on the Y-axis and move it -5.9 to the left on the X-axis.

```
<!--Imagen 3 en la pared derecha-->
<a-image src="url" position="5.9 1.5 0"></a-image>
```

In this case we raise the image 1.5 on the Y-axis and move it 5.9 to the right on the X-axis.

Add 3D objects to the scene

In this module exercise we will add

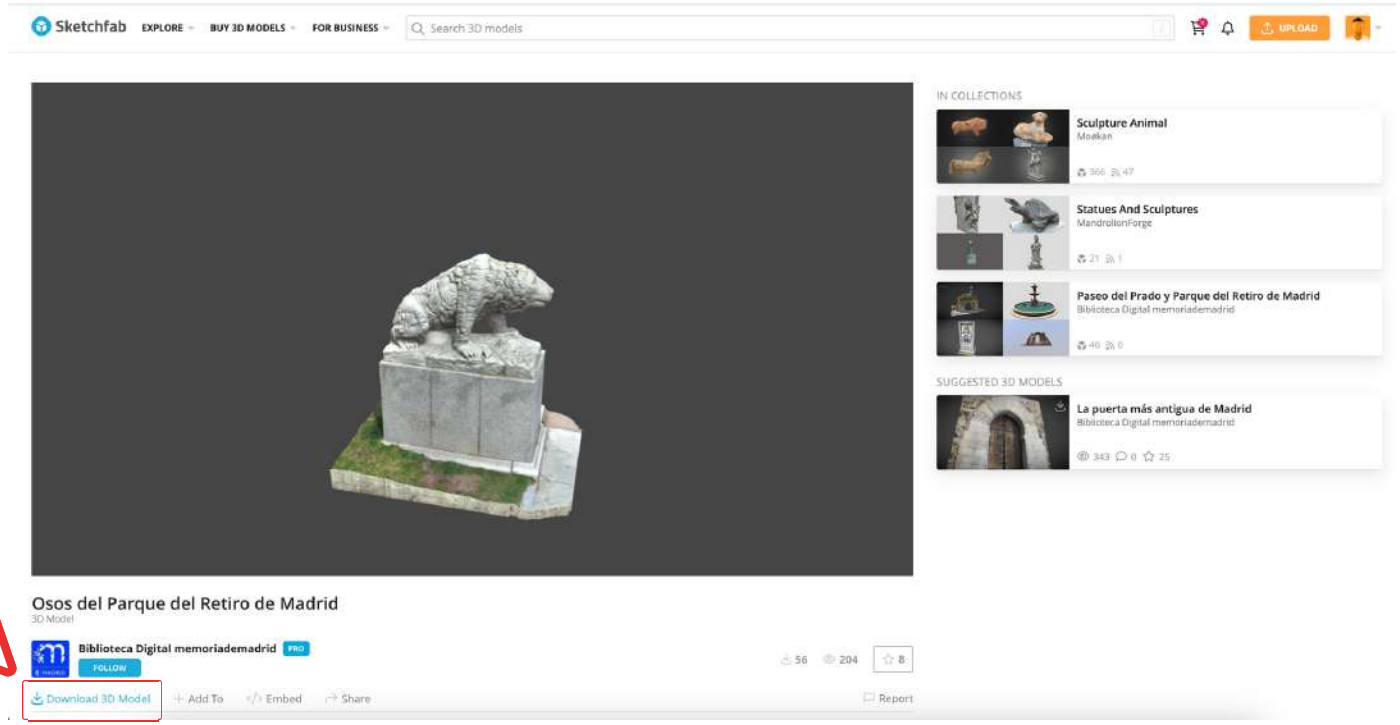
1. 3D object resource
2. Position the 3D object
3. Results

Follow the process

Remember that 3D objects, depending on the creator, will have one dimension or another. That is why it is important to navigate through the scene to find it and work with the scale attribute.

3D objects may take a while to load in the scene. Give the browser time to load everything correctly.

As we have seen in the theoretical part, 3D objects can be obtained from resource banks.
Then, go to the following link to download the object we are going to work with in this exercise:



Remember to download the 3D object in .glb to download only 1 file and upload it to Assets.

In this case, we will add an entity to integrate the 3D object:

```
<a-entity gltf-model="url" ></a-entity>
```

Let's add the scale attribute. Although in this case we will leave it with a value of 1 1 1:

```
<a-entity gltf-model="url" scale="1 1 1"></a-entity>
```

We are going to place it in the following position (you can put it in any position you prefer):

```
<a-entity gltf-model="url" scale="1 1 1" position="-3 0 -3"></a-entity>
```

(Remember to put the corresponding url in glt-model)

Final details

1. Add text
2. Light
3. Add music
4. Final results

Access the complete code of everything seen in the practical exercises of the module:

We are going to set the atmosphere in the museum by changing the lighting. We will add 4 points of light as light bulbs:

```
<!--Puntos de luz-->
    <a-light intensity="0.25" type="point" color="#FFF" position="0 2.9 -3"></a-light>
    <a-light intensity="0.25" type="point" color="#FFF" position="0 2.9 3"></a-light>
    <a-light intensity="0.25" type="point" color="#FFF" position="3 2.9 0"></a-light>
    <a-light intensity="0.25" type="point" color="#FFF" position="-3 2.9 0"></a-light>
```

We place the bulbs on the ceiling at 4 different points equidistant from the centre and in white.

Check the link in case you missed it

Let's add information to the scene with some text.

We will add on the back wall "Welcome to the Virtual Museum of Madrid":

```
<a-text value="Bienvenido al Museo Virtual de Madrid"  color="#000" position="3 1.5 -5.9"></a-text>
```

You can make line breaks in the text by simply hitting the "Enter" key on the line of code:

```
        <!--Texto-->
        <a-text value="Bienvenido al
                       Museo Virtual
                       de Madrid" position="3 1.5 -5.9"></a-text>
```

We are going to add ambient music to the virtual museum. If you want to download the one we used in the example click here:

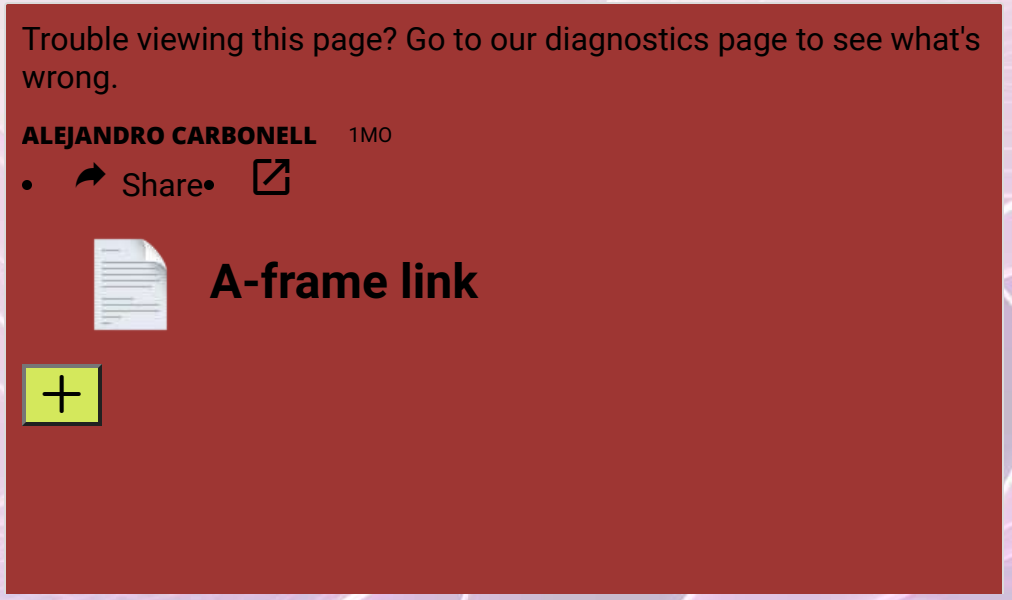
You can use the audio or music of your choice.

```
<a-audio src="url"  autoplay="true" loop="true"></a-text>
```

We have finished!

Try to continue working on your scene and add as many elements as you want.

Share your virtual scene here:



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and useful resources

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Música de William_King descargada en Pixabay: https://pixabay.com/music//?utm_source=link-attribution&utm_medium=referral&utm_campaign=music&utm_content=144998

Objeto 3D de Biblioteca Digital memoriademadrid descargado den Sketchfab: https://sketchfab.com/3d-models/osos-del-parque-del-retiro-de-madrid-bf32b290adf84d61b1bfe4423a2f6048

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