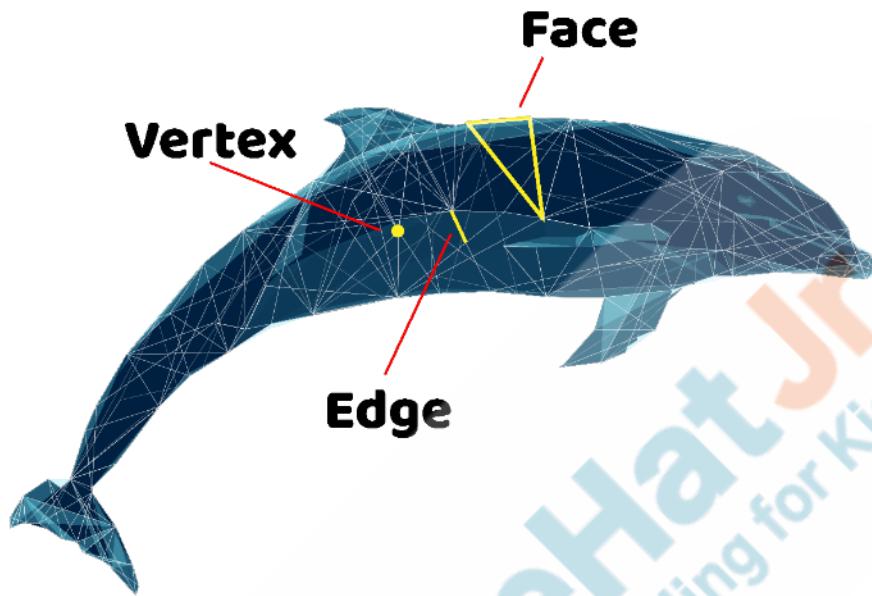


<b>Topic</b>	<b>INTRODUCTION TO 3D MODELS, LIGHTS &amp; SHADOWS</b>				
<b>Class Description</b>	Students learn about 3D models and how to use them in A-Frame. Students will also learn about different types of lights in the A-Frame scene and how to cast shadows of the virtual objects in the scene.				
<b>Class</b>	<b>C148</b>				
<b>Class time</b>	<b>45 mins</b>				
<b>Goal</b>	<ul style="list-style-type: none"> <li>● Add and load 3D gLTF models in the scene.</li> <li>● Add different types of light in the scene and cast shadows of the object</li> <li>● Animate lights</li> </ul>				
<b>Resources Required</b>	<ul style="list-style-type: none"> <li>● Teacher Resources             <ul style="list-style-type: none"> <li>○ Laptop with internet connectivity</li> <li>○ Earphones with mic</li> <li>○ Notebook and pen</li> </ul> </li> <li>● Student Resources             <ul style="list-style-type: none"> <li>○ Laptop with internet connectivity</li> <li>○ Earphones with mic</li> <li>○ Notebook and pen</li> </ul> </li> </ul>				
<b>Class structure</b>	<b>Warm-Up</b> <b>Teacher-led Activity</b> <b>Student-led Activity</b> <b>Wrap-Up</b>	<b>05 mins</b> <b>20 mins</b> <b>15 mins</b> <b>05 mins</b>			
<b>WARM-UP SESSION - 05 mins</b>					
<b><u>CONTEXT</u></b>					
<ul style="list-style-type: none"> <li>● Introduce 3D model(gLTF) in A-Frame and light components.</li> </ul>					

 <b>Teacher starts slideshow</b> from slides 1 to 20 Refer to speaker notes and follow the instructions on each slide.	
<b>Activity details</b> <i>Hey &lt;student's name&gt;. How are you? It's great to see you! Are you excited to learn something new today?</i> <b>Run the presentation from slide 1 to slide 3</b> <b>Following are the WARM-UP session deliverables:</b> <ul style="list-style-type: none"> <li>• Greet the student.</li> <li>• Revision of previous class activities.</li> <li>• Quizzes</li> </ul>	<b>Solution/Guidelines</b> <b>ESR:</b> Hi, thanks, Yes I am excited about it! Click on the slide show tab and present the slides
<b>Q&amp;A Session</b>	
<b>Question</b> The _____ attribute helps to create tube shapes. A. <a-torus> B. <a-ring> C. <a-tube> D. <a-circle>	<b>Answer</b> <b>A</b>
_____ can be used to create a starry night sky. A. <a-space> B. <a-universe> C. <a-sky> D. <a-star>	<b>C</b>
<b>Continue the WARM-UP session</b>	
<b>Activity details</b>	<b>Solution/Guidelines</b>

<p><b>Run the presentation from slide 4 to slide 20 to set the problem statement.</b></p> <p><b>Following are the WARM-UP session deliverables:</b></p> <ul style="list-style-type: none"> <li>• Appreciate the student.</li> <li>• Introduce 3D model(GLTF) in A-Frame and light components.</li> </ul>	<p>Narrate the story by using hand gestures and voice modulation methods to bring in more interest in students.</p>
 <p><b>Teacher ends slideshow</b></p>	
<p><b>TEACHER-LED ACTIVITY - 20 mins</b></p>	
<p><b>Teacher Initiates Screen Share</b></p>	
<p><b><u>CHALLENGE</u></b></p> <ul style="list-style-type: none"> <li>• Create a virtual 3-D realistic scene on the web.</li> </ul>	
<p><b>Step 2: Teacher-led Activity (10 mins)</b></p>	<p>For a realistic virtual scene we will need 3D models.</p> <p><b>3D models are created via specialized software by 3D artists or 3D modelers, which are basically mathematical representations of real world objects in three dimensions.</b></p> <p><i>Teacher will showcase a 10 sec video of the 3D model. Something like this. <a href="#"><u>[Teacher Activity 1]</u></a></i></p> <p><i>Link:</i></p>

	<p><a href="https://whitehatjrcontent.s3.ap-south-1.amazonaws.com/curriculum/PRO+Asset/Living+Room+Interior.mp4">https://whitehatjrcontent.s3.ap-south-1.amazonaws.com/curriculum/PRO+Asset/Living+Room+Interior.mp4</a></p> <p><b>3D models are stored</b> in the form of polygons, for example, a set of triangles, which is called a <b>mesh</b>.</p> <p>This information can be stored in the form of <b>vertices, edges or faces</b> depending on the application.</p> <p><b>[Teacher Activity 2 Illustration]</b> <i>Teacher shows the polygon structure to the students as an example. This is how a dolphin 3D model is constructed in the form of triangles, which is not visible to human eyes on a computer when models are used inside a computer.</i></p>	
--	--	--



Now, what are the file formats of images you have been using?

Great! These are file types used to store 2D images.

To store 3D models, the file formats used are **.obj**, **.fbx**, **.gltf**(or **.glb**) etc.

We are going to use **gLTF 3D models** in A-Frame.

gLTF stands for **Graphics Language Transmission Format**.

It is a standard file format for 3D models and scenes.

**ESR:**

.png, .jpg, .jpeg, etc.

	<p>Before we can use these models in our application, let's learn about <b>Asset Management in A-Frame</b>.</p> <p>Do you remember how we have managed assets in our previous applications?</p> <p>Yes, A-Frame also has its assets management system, which helps to load all the assets like 3D models, image textures, video textures and audio before rendering anything in the scene.</p> <p>Assets can be used directly, the way we have been using till now, thus for better 3D experience and games, it is better to preload all the assets.</p> <p>Let's see how we can do that?</p> <p><i>Teacher opens VS Code Editor, and writes the code to add the &lt;a-assets&gt; tag inside the &lt;a-scene&gt; tag.</i></p> <p><b>Imp Note:</b> Always toggle between the code screen and the output browser to show the changes to the student after updating code.</p>	<p><b>ESR:</b> Yes. In p5 we had a preload function, which is used to preload any asset like images, animations or sound before running the program.</p> <p><i>Student watches.</i></p>
--	--	---

<pre>&lt;!-------Asset Management-----&gt; &lt;a-assets&gt;  &lt;/a-assets&gt;</pre>	<p>In A-Frame assets can be added under <b>&lt;a-assets&gt;</b></p> <p>And Assets can be:</p> <ul style="list-style-type: none"> <li><b>&lt;a-asset-item&gt;</b> - Miscellaneous assets like 3D models.</li> <li><b>&lt;audio&gt;</b> - Sound files</li> <li><b>&lt;img&gt;</b> - Image textures</li> <li><b>&lt;video&gt;</b> - Video textures</li> </ul> <p>Great! We can now download the gLTF models of a few wild animals for Mike to capture good photographs.</p> <p><i>Teacher shows websites like sketchfab and google poly where a few free 3D models (.gltf, .obj etc) can be downloaded.</i></p> <p><i>Link : <a href="https://sketchfab.com/feed">https://sketchfab.com/feed</a></i></p> <p><b>To download gLTF models from the website(eg. <a href="https://sketchfab.com">sketchfab.com</a>):</b></p> <p><b>Note 1:</b> Create a free account on <a href="https://sketchfab.com">sketchfab.com</a> by using google</p>
--	---

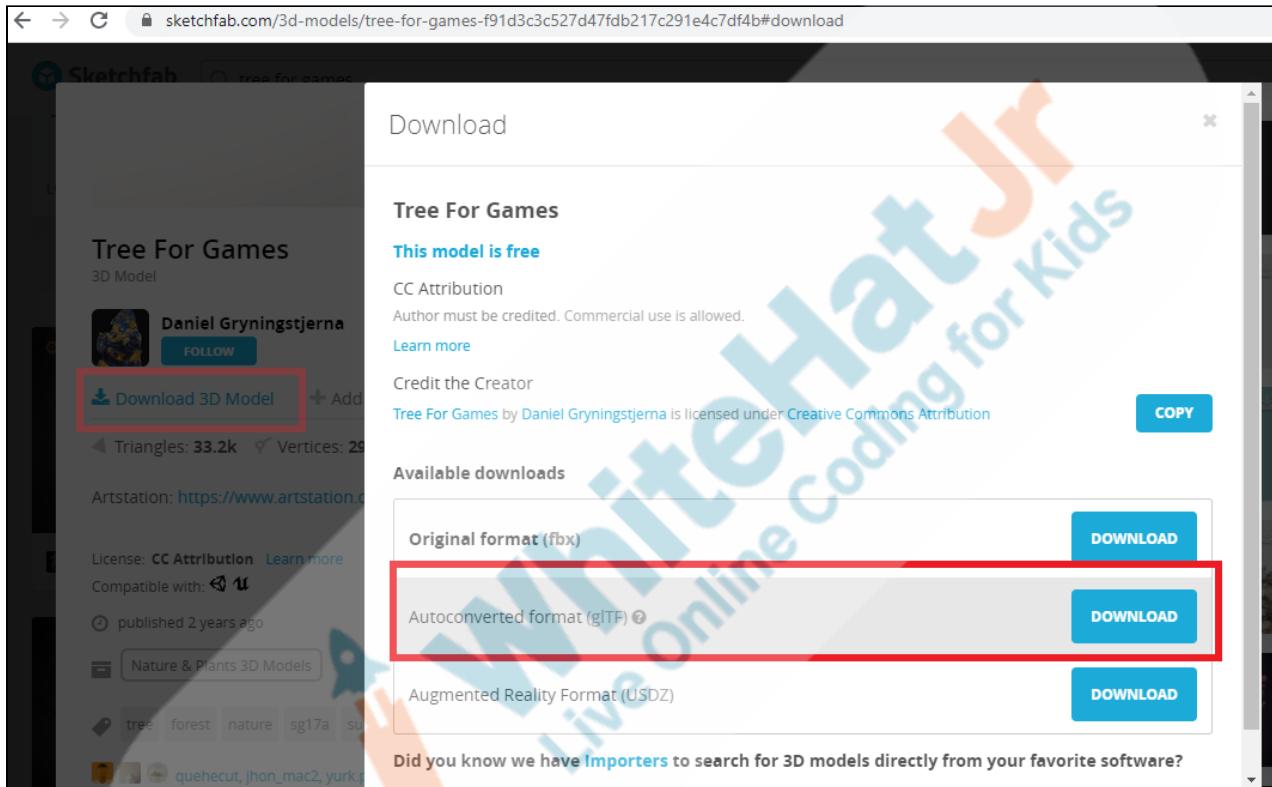
account and [Log in to your Sketchfab account.](#)

**Note 2:** The downloaded model used in the code might have a different look and feel with different filename but this does not affect the steps shown below. This is because the model uploaded at [sketchfab.com](https://sketchfab.com) sometimes is updated by the owner of the models or it sometimes gets removed from the website.

**Note 3:** In case any model reference link is not working, search for the different model of the same type.

- 1.) Search for the models.
- 2.) Open the model you want to download.
- 3.) Search for the download option(Make sure the download option is available and is free to use i.e., no payment amount should be displayed.)
- 4.) Click on “Download 3D Model” and when clicked on the download option the download pop up will appear.

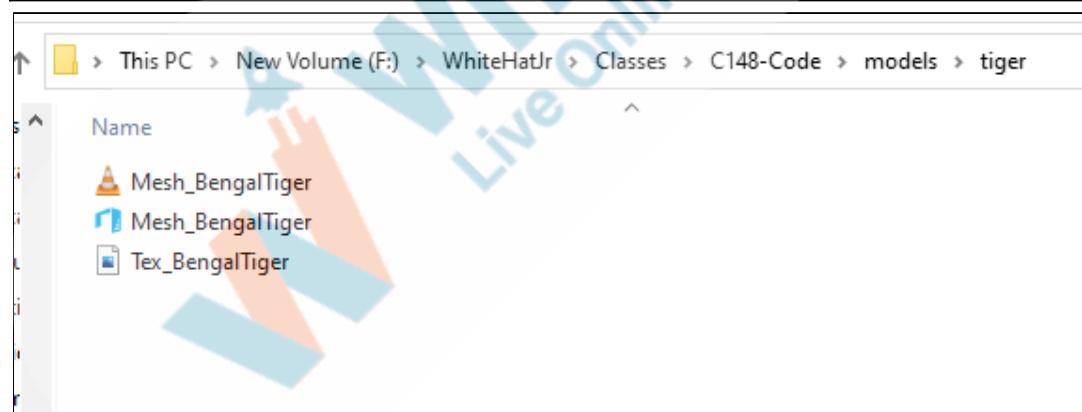
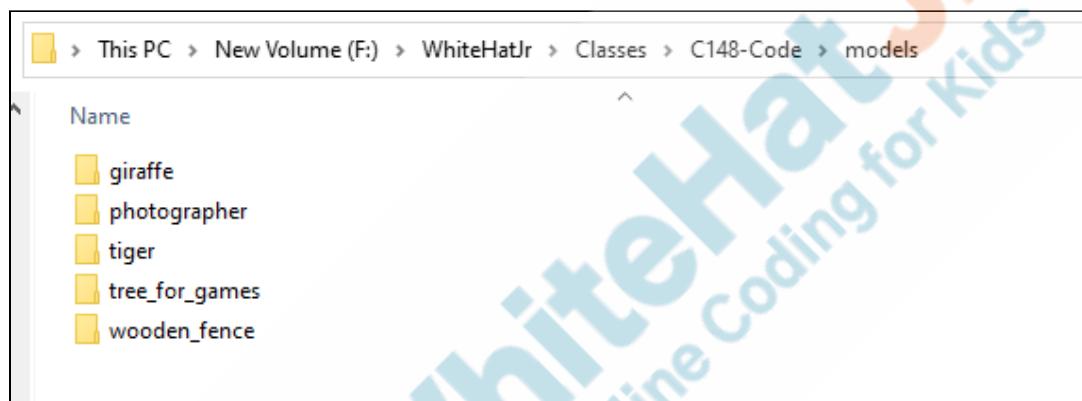
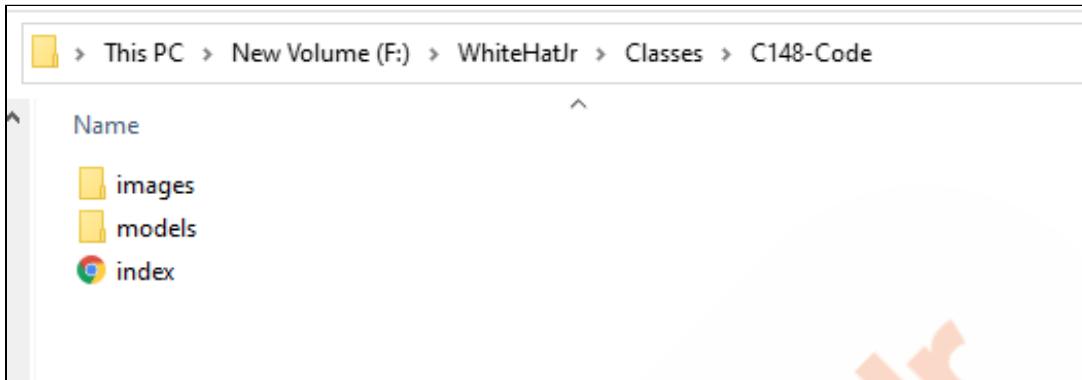
- 5.) Make sure the glTF model is available for download (like in the sample image below).



- 6.) After downloading the model, extract all the files from zip format, then keep all the files in the working directory (folder named like “assets” or “models”).

**Note:** *3D models generally come with multiple files. Keep a separate folder for all models with all the files that came along with them (Example below).*

**Working directory(folder): C148-Code**



	We can now use <b>&lt;a-asset-item&gt;</b> under <b>&lt;a-assets&gt;</b> .	
--	--	--

	<p>Add an attribute <b>src="source path/link"</b> specifying the path to the glTF model.</p>	
	<pre> &lt;!-- Asset Management --&gt; &lt;a-assets&gt;    &lt;a-asset-item src="./models/tiger/Mesh_BengalTiger.gltf"&gt;&lt;/a-asset-item&gt;  &lt;/a-assets&gt; </pre>	
	<p>But to access these assets now, we will use the <b>id</b> selector attribute.</p> <p>We can set the “<b>id</b>” attribute in <b>&lt;a-asset-item&gt;</b> and use a string as the <b>id</b> value so as to access it later.</p>	
	<pre> &lt;a-assets&gt;    &lt;a-asset-item id="tiger" src="./models/tiger/Mesh_BengalTiger.gltf"&gt;&lt;/a-asset-item&gt;  &lt;/a-assets&gt; </pre>	

	<p>the timeout, before starting the display.</p> <p>The default timeout is 3 secs.</p> <p>The scene waits for 3 secs to load all the assets by default before rendering entities on the screen. After 3 secs it will start showing all the entities and the one which is still not will be displayed after some once they are loaded.</p> <p>If timeout is reached the scene will start showing entities on the screen.</p>	
--	---	--

```
<!-------Asset Management----->
<a-assets timeout="10000">
    <a-asset-item id="tiger" src="./models/tiger/Mesh_BengalTiger.gltf"></a-asset-item>
</a-assets>
```

	<p>Now what's next? We cannot see the model on the web?</p> <p>Yes, to use this glTF model, we have the following ways:</p> <ol style="list-style-type: none"> <li>1. Loading a glTF model by using the asset that specifies the “src” of glTF using the “gltf-model” attribute.</li> <li>2. Directly using url.</li> </ol>	<p><b>ESR:</b></p> <p>We need to tell the computer now to use the asset to show the model on the web.</p>
--	---	---

	<p>3. &lt;a-gltf-model&gt; A-Frame primitive.</p> <p>We will use the first way, but you can always explore the rest later.</p> <p><i>Teacher creates an entity tag and uses the same id, <code>gltf-model="#id"</code>.</i></p>	
--	---	--

*Teacher creates an entity tag and uses the same id, `gltf-model="#id"`*

```
<!--GLTF Models-->

<!--Tiger-->
<a-entity >

  <a-entity gltf-model="#tiger">
  </a-entity>

</a-entity>
```

Add the values for **position**, **rotation** and **scale** attributes to set the model orientation.

```
<!--GLTF Models-->

<!--Tiger-->
<a-entity >

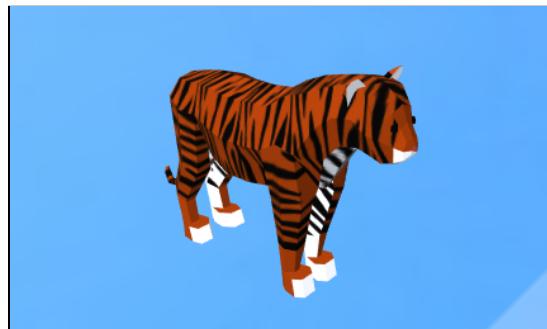
  <a-entity position="-5 2 0" rotation="0 55 0" scale="0.05 0.05 0.05" gltf-model="#tiger">
  </a-entity>

</a-entity>
```

**Note:** Try out different combinations of the values to adjust them properly. Use arrow keys to zoom in and out to see the result.

Let's see how that model looks on the web.

	(Output Sample Below)	ESR:Yes.
--	-----------------------	----------



Isn't that interesting?

Now you will be creating a scene for Mike to capture iconic snaps for his exhibition.

But before that can you tell me how we can see this model?

Yes, there is already some default light setting in A-Frame.

We can add our own lights to override the default light setting in the scene.

Let's learn about different types of lights first and how to set the lights in our scene.

In A-Frame, there are 5 types of lights available:

**ESR:**

To see this model there is some light in the scene.

	<p>1) <b>Ambient Light:</b> This light source spreads lights in every direction evenly over the scene affecting all the entities in the scene. We can set the color and intensity of light we want in the scene.</p> <p>2) <b>Hemispherical Light:</b> Being similar to the ambient light, this light source also affects all the objects entirely in the scene. In this light there are two different colors (attribute “color” and “groundColor”), one from the top and one from the bottom.</p> <p><i>[Teacher Activity 3 and 4 Illustration]</i></p> <p>3) <b>Point Light:</b> This light source is only limited to a point and spreads light in all directions from the point. For example, a bulb or candle. <b><i>The closer the light is to the object, the more you can see the object.</i></b> The light source is located at the centre of the source and emits light from the position.</p> <p><i>[Teacher Activity 3 and 4 Illustration]</i></p> <p>4) <b>Spot Light:</b> This light source starts from a point and emits light in one direction in the</p>	
--	--	--

	<p>form of a cone like a torch. <i>Spot light needs a target on which it can fall.</i> <i>Spot light creates spots of the light on the surface.</i></p> <p><b>[Teacher Activity 3 Illustration and Class Activity]</b></p> <p>5) <b>Directional Light:</b> This light source is one which is located very far away like a sun, emitting light in a particular direction. The position attribute can be used to set the direction of the light.</p> <p>We will <b>not</b> be using all the lights in our scene. Different types of light can be used based on what we need in the virtual environment.</p> <p>For example for our scene Mike is capturing the pictures during the normal day, so we need light all over the scene, for this we will use ambient light.</p> <p>And during the day time we see shadows of all objects under the sunlight.</p> <p>In A-Frame only 3 lights, point light, directional light and spot light can cast shadow, which we will see in a while, how to cast shadows.</p>	
--	---	--

Now we can use directional light to cast shadows of all objects at once because point and spot light have to be closer to the objects which is not the case when you are out in the day.

**Let's add an ambient light and a directional light.**

**By default these are two sources of light which are already present in the A-Frame scene and we will see how we can use these 2 lights in our scene which will override the default settings.**

*Teacher creates a <a-entity> tag.*

*Teacher adds light component inside <a-entity> and sets different attributes of the light:*

*All the lights have few basic properties:*

**type:** One of ambient, directional, hemisphere, point, spot.

**color:** color of the light

**intensity:** brightness of the light

*In here let's set the attributes,*

**For Ambient Light:**

**type:ambient**

**intensity:0.5**

**Imp Note :** Show the output after adding one light and then another.

**For Directional Light:**

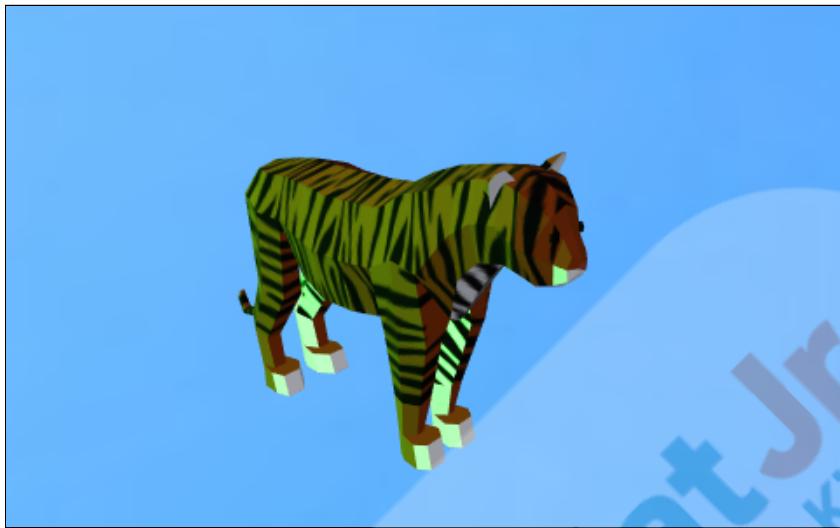
**type:** directional  
**intensity:** 5  
**distance:** 50 (where the intensity becomes zero, that means the light will end there)  
**decay:** 2 (amount of light that starts dim along the distance)  
**color:** green  
**position=**"-100 18 20"

```
<!-------Lights in the scene----->

<!--Ambient-->
<a-entity light="type: ambient; intensity: 0.5;">
</a-entity>

<!--Directional-->
<a-entity >
  <a-entity light="type: directional; intensity: 5; distance: 50; decay: 2; color:green"
    | position="-100 18 20"></a-entity>
</a-entity>
```

Here the directional light has a very high intensity of 5 and the color of the light is set to green.



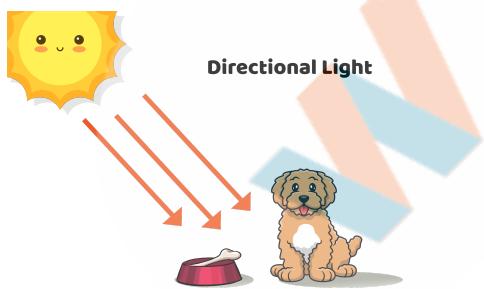
It's really interesting to see the lights in the scene.

What do you think is missing now?

Great!

Among all the lights in A-Frame, only Point light, Spot light and Directional light can cast shadows of the objects present in the scene.

**ESR:**  
Shadow of the tiger.



We can set the attribute  
**“castShadow:true” in the light**  
component to see the shadow. Let's use yellow light like the sun.

	<p>And the <b>shadow="cast:true"</b> for the gLTF model also.</p> <p><i>Teacher shows the output but there will be no shadow.</i></p>	
--	---	--

```
<!--Directional-->
<a-entity>
  <a-entity light="type: directional; castShadow: true; intensity: 1; distance: 50; decay: 2; color:yellow"
  position="-100 18 20"
  ></a-entity>

</a-entity>

-----GLTF Models-----

<!--Tiger-->
<a-entity>
  <a-entity position="-5 2 0" rotation="0 55 0" scale="0.05 0.05 0.05" gltf-model="#tiger"
  shadow="cast: true;">
  </a-entity>
</a-entity>
```

	<p>We don't see any shadow in the scene, what could be the reason?</p> <p>Exactly!</p> <p>There must be at least one entity in the scene to receive the shadow.</p> <p>Let's add the <b>circular plane</b> and set the <b>shadow="receive:true"</b>.</p> <p>Set the attributes <b>position</b>, <b>rotation</b>, <b>radius</b>, <b>color</b> and <b>visible</b> for the circular ground to set its orientation.</p>	<p><b>ESR:</b> There is nothing in the scene on which the shadow can fall.</p>
--	---	--

```
<!--Directional-->
<a-entity>
  <a-entity light="type: directional; castShadow: true; intensity: 1; distance: 50; decay: 2; color:yellow"
  position="-100 18 20"
  ></a-entity>

</a-entity>

<!--Circular Plane-->
<a-circle position="-0.4 -0.76 -25" rotation="-90 0 0" radius="100" shadow="receive: true" visible="true"
  color="#2E6F10">
</a-circle>
<!--GLTF Models-->

<!--Tiger-->
<a-entity>
  <a-entity position="-5 2 0" rotation="0 55 0" scale="0.05 0.05 0.05" gltf-model="#tiger"
  shadow="cast: true;">
  </a-entity>
</a-entity>
```



Perfect!

Now that we have learned how to add 3D models and set the lights in our scene, it's your turn. Please share your screen with me.

**Teacher Stops Screen Share**

**STUDENT-LED ACTIVITY - 15 mins**

- Ask Student to press ESC key to come back to panel
- Guide Student to start Screen Share
- Teacher gets into Fullscreen

### ACTIVITY

- Explore different real world 3D models
- Learn about the importance of lights
- Create a new project with life like real world objects



**Teacher starts slideshow** from slides 21 to 22  
 Refer to speaker notes and follow the instructions on each slide.

Now it's your turn. Please share your screen with me.



**Teacher ends slideshow**

**Step 3:  
Student-Led  
Activity  
(20 mins)**

*Guide the student to open the project in VS Code Editor.  
 Guide the student to edit code inside index.html file.*

*The student edits the code and tests the output.*

*Encourage the student to edit code and see change in outputs by asking questions and giving challenges.*

*C1: Guide the student to download all the gLTF models [Model Links will be present under Student Activities(1-5)] in the local directory(folder).*

<p><b>Note 1:</b> The model links provided in the Student Activities(1-5) are only for reference purposes. The student can search for their own model of the same type in case the link does not work.</p> <p><b>Note 2:</b> The <u>downloaded model used in the code might have a different look and feel with different filename but this does not affect the steps shown below.</u></p> <p>Note 1 and 2 is because the model uploaded at <a href="https://sketchfab.com">sketchfab.com</a> sometimes is updated by the owner of the models or it sometimes gets removed from the website. In case any model reference link is not working, search for the different model of the same type.</p> <p>C2: Guide the student to add &lt;a-assets&gt; primitive and add 3D model “src” inside that.</p>		<p>Students add different models in the scene.</p>
---	--	--

```

<body>
<a-scene background="color:white">

<a-camera position="0 8 15"></a-camera>

<!-------Asset Management----->
<a-assets timeout="10000">

    <a-asset-item id="tiger" src=".models/tiger/Mesh_BengalTiger.gltf"></a-asset-item>

    <a-asset-item id="giraffe" src=".models/giraffe/scene.gltf"></a-asset-item>

    <a-asset-item id="fence" src=".models/wooden_fence/scene.gltf"></a-asset-item>

    <a-asset-item id="tree" src=".models/tree_for_games/scene.gltf"></a-asset-item>

    <a-asset-item id="photographer" src=".models/photographer/scene.gltf"></a-asset-item>

</a-assets>

<a-sky src="#bg"></a-sky>

```

*C3: Guide the student to add gltf-model inside the <a-entity> mapped to the asset using the id selector value.*

Good Job!

```

<!--Giraffe-->
<a-entity>
  <a-entity position="-9 4 8.2" rotation="0 90 0" scale="1 1 1" gltf-model="#giraffe"
    | shadow="cast: true; receive: false">
  </a-entity>
</a-entity>

<!--Photographer-->
<a-entity>
  <a-entity position="20 0 0" rotation="0 -90 0" scale="1 1 1" gltf-model="#photographer"
    | shadow="cast: true; receive: false">
  </a-entity>
</a-entity>

<!--Trees-->

<a-entity position="-10 0 -1" rotation="0 0 0" scale="0.009 0.009 0.009" gltf-model="#tree"
  | shadow="cast: true; receive: false">
</a-entity>

<a-entity position="10 0 -1" rotation="0 0 0" scale="0.009 0.009 0.009" gltf-model="#tree"
  | shadow="cast: true; receive: false">
</a-entity>

<!--Fence-->
<a-entity>
  <a-entity position="-2 -0.9 -10" rotation="0 0 0" scale="0.005 0.005 0.005" gltf-model="#fence"
    | shadow="cast: true; receive: false">
  </a-entity>
</a-entity>

```

Now what's next?

Great! Let's use directional light in the scene and cast shadows.

That looks amazing. You have done a great job in creating a realistic virtual scene for Mike.

Looks like Mike is all set for his exhibition, right? Or is there anything else we can do?

Any idea , how can we do this?

**ESR:**Adding the lights and casting shadows.

	<p>Yes. Amazing!</p> <p>Let's do that too.</p> <p><i>C4: Guide the student to add the animation for the light source (learned in previous class)</i></p> <p><i>Let the child explore and play with the example.</i></p>	<p><b>ESR:</b> Yes, We move the light source, maybe like a sun.</p> <p><b>ESR:</b> We can use the animation component for the light source also, like we did for the planets in the solar system.</p>
<pre>&lt;!--Lights in the scene--&gt; &lt;!--Ambient--&gt; &lt;a-entity light="type: ambient; intensity: 0.5;"&gt; &lt;/a-entity&gt;  &lt;!--Directional--&gt; &lt;a-entity animation="property: rotation; to: 0 360 0; easing: linear; loop: true; dur: 60000"&gt;     &lt;a-entity light="type: directional; castShadow: true; intensity: 1; distance: 50; decay: 2; color: yellow"&gt;         &lt;position&gt;-100 18 20&lt;/position&gt;     &lt;/a-entity&gt; &lt;/a-entity&gt;  &lt;!--Circular Plane--&gt; &lt;a-circle position="-0.4 -0.76 -25" rotation="-90 0 0" radius="100" shadow="receive: true" visible="true" color="#2E6F10"&gt; &lt;/a-circle&gt;  &lt;!--GLTF Models--&gt; &lt;!--Tiger--&gt; &lt;a-entity&gt;     &lt;a-entity position="-5 2 0" rotation="0 55 0" scale="0.05 0.05 0.05" gltf-model="#tiger" shadow="cast: true;"&gt;     &lt;/a-entity&gt; &lt;/a-entity&gt;</pre>		



You have created an amazing scene for Mike, with proper lights so that he can have the best shots for him.

Good Job!

**Note:** Students can create a different output with different models.

**Teacher Guides Student to Stop Screen Share**

**WRAP-UP SESSION - 5 Mins**

#### **FEEDBACK**

- Complement the student for her/his effort in the class.
- Encourage the student to move in the scene using WASD/arrow keys and mouse.



Teacher starts slideshow from slide 23 to slide 33

**Activity details**

**Solution/Guidelines**

Run the presentation from slide 23 to slide 33

Following are the wrap-up session deliverables:

- Explain the facts and trivias
- Next class challenge
- Project for the day
- Additional Activity

Guide the student to develop the project and share with us.

### Quiz Time - Click on In-Class Quiz

Question	Answer
What are the different types of light available in A-frame?  A. Ambient Light, Hemispherical Light B. Point Light, Spot Light C. Directional Light D. Ambient Light, Hemispherical Light, Point Light, Spot Light, Directional Light	D
3D models are stored in the form of polygons, for example, a set of triangles, which is called a _____  A. net B. mesh C. network D. polygon	B
What does glTF stand for?  A. Graphics Logic Transmission Format B. Graphics Language Translation Format C. Graphics Language Transmission Format D. Graphics Logic Transformation Format	C
• End the quiz panel	
	You get a "hats off".  Make sure you have given at least 2 Hats Off during the class for:

	<p>Alright. I will look forward to seeing how you create your scene using gLTF models and lights in the scene .</p>	<div style="background-color: #00AEEF; color: white; padding: 5px; border-radius: 10px;"> <span>Creatively Solved Activities</span>  +10         </div> <div style="background-color: #00AEEF; color: white; padding: 5px; border-radius: 10px;"> <span>Great Question</span>  +10         </div> <div style="background-color: #00AEEF; color: white; padding: 5px; border-radius: 10px;"> <span>Strong Concentration</span>  +10         </div>
<b>Project Overview</b>	<p><b>EVENING WALK</b></p> <p><b>Goal of the Project:</b> The student will create a night scene simulation with a girl, cat and bench under the moonlight.</p> <p>Students will practice how to upload the gLTF models or any other type of 3D models.</p> <p>They will create a light source in the scene and cast shadows of the 3D models in the scene.</p> <p><b>Story:</b></p> <p>gLTF models, created by 3D model artists, are a better way to create a realistic virtual environment.</p> <p>Nowadays 3D models are used by many companies to give them a real life-like experience without actually being there.</p>	

	<p>Write an A-Frame program to create a real life situation scene representing a girl who is trying to help a cat to find its way in the dark.</p> <p>I am very excited to see how you will create your scene using gLTF models.</p> <p>Bye!</p>	
<div style="background-color: #92D050; padding: 10px; text-align: center;"> <span style="font-size: 2em; color: white;">A</span>  <span style="font-size: 1em; color: white;">live online Coding for Kids</span> </div>		
<b>Additional Activities</b>	<p><i>Guide the student for adding grass texture using asset management.</i></p> <pre> &lt;img id="bg" src="./images/sky.jpg"&gt;   &lt;img id="ground" src="./images/TexturesGrass.jpg"&gt; &lt;/a-assets&gt;  &lt;!-- Circular Plane --&gt; &lt;a-circle position="-0.4 -0.76 -25" rotation="-90 0 0" radius="100" shadow="receive: true" visible="true" src="#ground"&gt; &lt;/a-circle&gt;</pre>	
<span style="color: red; border-radius: 50%; padding: 5px 10px; border: 1px solid red;">✖ End Class</span>		



Activity	Activity Name	Links
Teacher Activity 1	3D Model Showcase	<a href="https://s3-whitehatjrcontent.whjr.online/curriculum/PRO+Asset/Living+Room+Interior.mp4">https://s3-whitehatjrcontent.whjr.online/curriculum/PRO+Asset/Living+Room+Interior.mp4</a>
Teacher Activity 2	Polygon Representation of 3D model	<a href="https://s3-whitehatjrcontent.whjr.online/curriculum/PRO+Asset/3D+Model+Polygon+Mesh.pdf">https://s3-whitehatjrcontent.whjr.online/curriculum/PRO+Asset/3D+Model+Polygon+Mesh.pdf</a>
Teacher Activity 3	Type of lights	<a href="https://s3-whitehatjrcontent.whjr.online/curriculum/PRO+Asset/Types+of+Light+Illustration+PRO+C148.pdf">https://s3-whitehatjrcontent.whjr.online/curriculum/PRO+Asset/Types+of+Light+Illustration+PRO+C148.pdf</a>
Teacher Activity 4	Point Light and Spot Light Illustration	<a href="https://whitehatjr.github.io/PRO-C148-TypesOfLight/">https://whitehatjr.github.io/PRO-C148-TypesOfLight/</a>
Teacher Activity 5	Teacher Reference Code	<a href="https://github.com/whitehatjr/PRO-C148-Activity-Reference">https://github.com/whitehatjr/PRO-C148-Activity-Reference</a>
Student Activity 1	Model 1 Sample Reference Link	<a href="https://sketchfab.com/3d-models/tiger-reScan-photo-test-7f30a460abbc41a49f86984d8a6e791c">https://sketchfab.com/3d-models/tiger-reScan-photo-test-7f30a460abbc41a49f86984d8a6e791c</a>

Student Activity 2	Model 2 Sample Reference Link	<a href="https://sketchfab.com/3d-models/giraffe-e73c5c4354af4af4af46b711f5a8a972">https://sketchfab.com/3d-models/giraffe-e73c5c4354af4af4af46b711f5a8a972</a>
Student Activity 3	Model 3 Sample Reference Link	<a href="https://sketchfab.com/3d-models/photographer-8b11c87a4fff43e1892e44ff626b661d">https://sketchfab.com/3d-models/photographer-8b11c87a4fff43e1892e44ff626b661d</a>
Student Activity 4	Model 4 Sample Reference Link	<a href="https://sketchfab.com/3d-models/tree-for-games-f91d3c3c527d47fdb217c291e4c7df4b">https://sketchfab.com/3d-models/tree-for-games-f91d3c3c527d47fdb217c291e4c7df4b</a>
Student Activity 5	Model 5 Sample Reference Link	<a href="https://sketchfab.com/3d-models/wooden-fence-738c6b55dfd8411fa8fc259342888f83">https://sketchfab.com/3d-models/wooden-fence-738c6b55dfd8411fa8fc259342888f83</a>
Student Activity 6	Blank Activity Template	<a href="https://github.com/whitehatjr/PRO-C148-Student-Activity">https://github.com/whitehatjr/PRO-C148-Student-Activity</a>
Project Solution Link	Evening Walk	<a href="https://github.com/whitehatjr/PRO-VR-C148">https://github.com/whitehatjr/PRO-VR-C148</a>
Teacher Ref. Visual Aid Link	Visual Aid link	<a href="https://curriculum.whitehatjr.com/visual+Project+Asset/PRO_VD/PRO_C148_withcues.html">https://curriculum.whitehatjr.com/visual+Project+Asset/PRO_VD/PRO_C148_withcues.html</a>
Teacher Ref. In-Class Quiz	In-Class Quiz	<a href="https://s3-whjr-curriculum-uploads.whjr.online/a4447cb2-e407-4764-a7f9-314aae04965e.pdf">https://s3-whjr-curriculum-uploads.whjr.online/a4447cb2-e407-4764-a7f9-314aae04965e.pdf</a>