


Topic	CURSOR EVENTS	
Class Description	Students learn about the A-Frame cursor component. Students also learn about the mouseenter and mouseleave events associated with the A-Frame cursor component.	
Class	C158	
Class time	45 mins	
Goal	<ul style="list-style-type: none"> • Learn about A-Frame cursor components. • Add cursor mouseenter and mouseleave events to the scene. • Learn to handle cursor events to select and deselect an A-Frame entity. 	
Resources Required	<ul style="list-style-type: none"> • Teacher Resources <ul style="list-style-type: none"> ○ Visual Studio Code Editor ○ laptop with internet connectivity ○ earphones with mic ○ notebook and pen • Student Resources <ul style="list-style-type: none"> ○ Visual Studio Code Editor ○ laptop with internet connectivity ○ earphones with mic ○ notebook and pen 	
Class structure	Warm Up Teacher-led Activity Student-led Activity Wrap-Up	05 mins 15 mins 20 mins 05 mins
WARM-UP SESSION - 05 mins		



Teacher starts slideshow from slides 1 to 10

Refer to speaker notes and follow the instructions on each slide.

Activity details	Solution/Guidelines
<p>Hi, how have you been? Are you excited to learn something new?</p> <p>Run the presentation from slide 1 to slide 3.</p> <p>The following are the warm-up session deliverables:</p> <ul style="list-style-type: none"> Reconnect with previous class topics. Warm-Up quiz session. 	<p>ESR: Varied Response.</p> <p>Click on the slide show tab and present the slides.</p>
Q&A Session	
Question	Answer
<p>How did we add content to the page?</p> <p>A. by creating an A-frame component called tour B. by creating an A-frame component called fly C. by creating an A-frame component called hover D. by creating an A-frame component called race</p>	A
<p>What is a thumbnail image?</p> <p>A. a small image that represents a larger one B. a large image that represents a smaller one C. a small file that is used to store image D. zoomed in image</p>	A
Continue the WARM-UP session	
Activity details	Solution/Guidelines

<p>Run the presentation from slide 4 to slide 10 to set the problem statement.</p> <p>The following are the warm-up session deliverables:</p> <ul style="list-style-type: none"> • Review code from the last class. • A-Frame cursor events. 		
<p>Teacher ends slideshow</p>		
<p>Teacher Initiates Screen Share</p>		
<p>TEACHER-LED ACTIVITY - 15 mins</p>		
<p><u>CHALLENGE</u></p> <ul style="list-style-type: none"> • Add an A-Frame cursor ring. • Write a function to change the color of the selected thumbnail ring on the mouseenter event. 		
<p>Step 2: Teacher-led Activity (15 mins)</p>	<p><i><The teacher opens the code from the previous class></i> [Teacher Activity 1]</p>	
	<p>Since we want to select the place of our choice and we also want to know which place we selected, any idea, how can we indicate that?</p>	<p>ESR: We can highlight when the cursor goes on the image.</p>
	<p>Yes, and how can we do so?</p> <p>We need something that can help us to select an A-Frame entity element.</p> <p>For this, A-Frame has a cursor component which provides hover and click states for interaction.</p>	<p>ESR: Varied.</p>

	<p>The cursor component listens to events such as mousedown, mouseup, mouseenter, mouseleave, and click events.</p>	
	<p>To use this cursor component, let's first create it.</p> <p>Where will we create the cursor?</p> <p>In the index.html file we'll create the cursor entity as the child of the camera entity so that the cursor is always visible to us no matter where we look in the scene.</p> <p>Also, we should put the cursor in front of the camera by placing it on the negative z-axis.</p> <p><i><The teacher adds a cursor entity in index.html file.></i></p> <p>To provide a shape/appearance to the cursor, we can use the geometry or material components.</p> <p><i><The teacher sets the following attributes to the cursor entity.></i></p> <ul style="list-style-type: none"> • id = camera-cursor • cursor • position = 0 ,0,-1 	<p>ESR: In the index.html file.</p>

	<ul style="list-style-type: none"> • geometry="primitive: ring; radiusInner: 0.02; radiusOuter: 0.03" • material="color: #fff; shader: flat" 	
<pre><!-- CURSOR --> <a-entity id="camera-cursor" cursor position="0 0 -1" geometry="primitive: ring; radiusInner: 0.02; radiusOuter: 0.03" material="color: #fff; shader: flat" > </a-entity></pre>		
	<p>Let's create a file which will contain all the cursor events.</p> <p><i><The teacher creates a CursorEvents.js file and adds it to the index.html file></i></p> <p>We'll create a cursor-listener component using the A-FRAME.register component().</p> <p><i><The teacher creates a cursor-listener component using A-FRAME.registerComponent and attach the component in the places-container entity in the index.html file.></i></p>	
<pre><script src="js/CursorEvents.js"></script> <script src="js/Tour.js"></script></pre>		

```
AFRAME.registerComponent("cursor-listener", {  
  // ...  
})
```

```
<!-- Places Container -->  
<a-entity id="places-container" cursor-listener tour></a-entity>
```

	<p>Alright. So what do we want to do when our cursor moves on the thumbnail?</p>	<p>ESR: We can change the color of the rings.</p>
	<p>Yes. So let's write a function which will handle the events defined on the A-Frame cursor.</p> <p>Whenever the cursor is hovering over the entity, the mouseenter event is triggered.</p> <p>As soon as the cursor is away from the entity, a mouseleave event is triggered.</p> <p>Let's begin with writing a function, handleMouseEnterEvents().</p> <p>Inside the function we'll add an event listener, mouseenter, which will continuously listen to the cursor movements.</p> <p><i><The teacher adds a handleMouseEnterEvents() function</i></p>	

	<p><i>and add the event listener using <code>this.el.addEventListener().></code></i></p> <p>Do you remember that we have created thumbnails for places and assigned unique id to each of one them in our Tour.js file?</p> <p>We'll use those ids to check where our cursor is.</p> <p>Let's define a schema having selectedItemId as the data and write a function, handlePlaceListState(), which will check for the selected thumbnail's id.</p> <p><i><The teacher defines schema <code>{ }</code> in the component.></i></p> <p><i><The teacher adds a function called as <code>handlePlacesListState().></code></i></p>	<p>ESR: Yes.</p>
	<pre> schema: { selectedItemId: { default: "", type: "string" }, }, handlePlacesListState: function () { }, </pre>	
	<p>To check if the place is selected-</p> <ul style="list-style-type: none"> First, we'll get the id using the getAttribute() function and 	<p><i>The student observes and asks questions.</i></p>

	<p>store it in the constant variable id.</p> <ul style="list-style-type: none"> • Then we'll create an array of all the ids of the places and call it placesId. • Using the if condition we'll check if the placesId list contains the id. • If the id is the same, then using the document.querySelector() method, select the places-container entity and set the cursor-listener component for the entity. <p>Then we'll change the color of the selected thumbnail ring using the setAttribute() method and then call the function.</p> <p><i><Teacher creates a function called as handlePlacesListState></i></p> <p><i><Teacher calls the function handlePlacesListState() inside the handleMouseEnterEvents() function></i></p>	
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```
handlePlacesListState: function () {
  const id = this.el.getAttribute("id");
  const placesId = ["taj-mahal", "budapest", "new-york-city", "eiffel-tower"];
  if (placesId.includes(id)) {
    const placeContainer = document.querySelector("#places-container");
    placeContainer.setAttribute("cursor-listener", {
      selectedItemId: id,
    });
    this.el.setAttribute("material", {
      color: "#D76B30",
      opacity: 1,
    });
  }
},
```

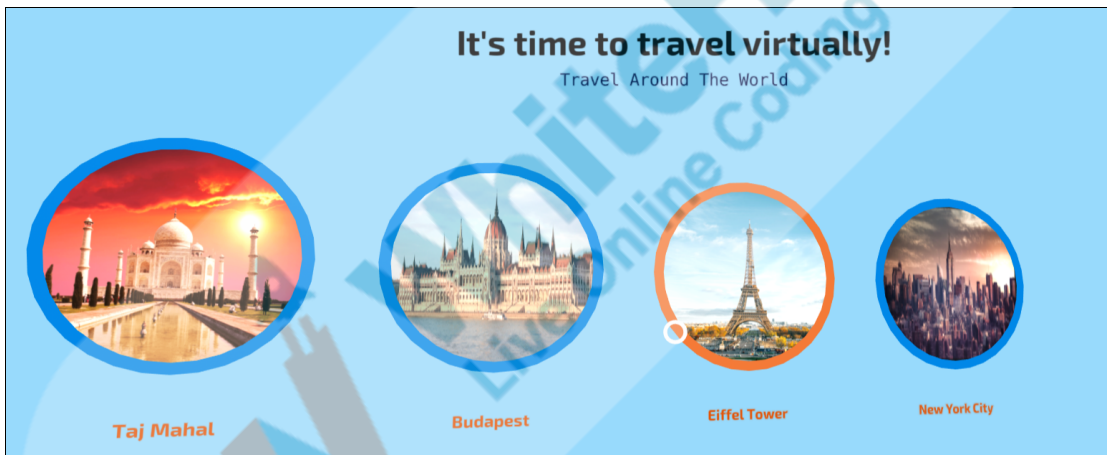
```
handleMouseEnterEvents: function () {
  // Mouse Enter Events
  this.el.addEventListener("mouseenter", () => {
    this.handlePlacesListState();
  });
},
```


You won't be able to see the output.

The reason is, we need to set the cursor-listener event to the ring entity created for the border of the thumbnail inside the createBorder function (in Tour.js file).

<The teacher adds the cursor-listener event to the createBorder function inside the Tour.js file>




```
createBorder: function (position, id) {
  const entityEl = document.createElement("a-entity");
  entityEl.setAttribute("id", id);
  entityEl.setAttribute("visible", true);
  entityEl.setAttribute("geometry", {
    primitive: "ring",
    radiusInner: 9,
    radiusOuter: 10,
  });
  entityEl.setAttribute("position", position);
  entityEl.setAttribute("material", {
    color: "#0077CC",
    opacity: 1,
  });
  entityEl.setAttribute("cursor-listener", {});
  return entityEl;
},
```






	<p>Ok, now the rings will change color when the cursor hovers over it but when we take the cursor away from it, the color still remains the same.</p> <p>What can we do about it?</p> <p>Awesome! Can you try writing that function?</p> <p>I'll guide you where you need help.</p>	<p>ESR: We can have another function that will revert the color when the mouse cursor is away from the thumbnail image and ring border.</p> <p>ESR: Yes.</p>
	Let's get started then.	
Teacher Stops Screen Share		
	Now it's your turn. Please share your screen with me.	
STUDENT-LED ACTIVITY - 20 mins		
<ul style="list-style-type: none"> • Ask the student to press the ESC key to come back to the panel. • Guide the student to start screen share. • Teacher gets into fullscreen. 		
<p align="center"><u>ACTIVITY</u></p> <ul style="list-style-type: none"> • Write function for mouse leave event to deselect the entity when mouse is away from the entity. 		
<p align="center"> Teacher starts slideshow  for slide 11 to 13. </p>		

Step 3: Student-Led Activity (20 mins)	<i><Teacher guides the student to clone the code from Student Activity 1></i> <u>[Student Activity 1]</u>	<i><Student clones the code from Student Activity 1></i>
	<p>Now, we need a function which will handle the events after the mouse leaves the image.</p> <p>Let's call this function as handleMouseLeaveEvents().</p>	<i><Student codes to create the function></i>
	<pre> handleMouseLeaveEvents: function () { // Mouse Leave Events } </pre>	
	<p>In the function, first, we'll add the event listeners to listen to the mouse events.</p> <p>Here we'll be checking for the mouseleave event.</p> <p>Inside the listener event-</p> <ul style="list-style-type: none"> • We'll get the selectedItemId from the schema. • If we have an id in the schema then, using document.querySelector(), we'll get the selected element and store it in the "el" variable. • Using the getAttribute() method, get the id of that 	<i><Student codes to write the function></i>

	<p>element and store it in a constant variable, id.</p> <ul style="list-style-type: none"> Using the if condition we'll check if id==selectedItemId. Using the setAttribute() method, set the color back to normal, that is, blue. <p><i><Teacher helps the student with the code></i></p>	
<pre>handleMouseLeaveEvents: function () { // Mouse Leave Events this.el.addEventListener("mouseleave", () => { const { selectedItemId } = this.data; if (selectedItemId) { const el = document.querySelector(`#\${selectedItemId}`); const id = el.getAttribute("id"); if (id == selectedItemId) { el.setAttribute("material", { color: "#0077CC", opacity: 1, }); } } }); }</pre>		
	<p>Now we just have to call these functions inside the init function.</p> <p><i><Teacher guides the student to call the functions inside the init function ></i></p>	<p><i><Student codes to call the functions inside the init function.></i></p>
<pre>init: function () { this.handleMouseEnterEvents(); this.handleMouseLeaveEvents(); },</pre>		

	Now let's run the code to see the output.	<i><student runs the code to check the output></i>
<div> <p>It's time to travel virtually! Travel Around The World</p>  <p>Taj Mahal Budapest Eiffel Tower New York City</p> </div> <div> <p>It's time to travel virtually! Travel Around The World</p>  <p>Taj Mahal Budapest Eiffel Tower New York City</p> </div>		
Teacher Guides Student to Stop Screen Share		
<u>WRAP-UP SESSION - 5 Mins</u>		
<p>Teacher starts slideshow  from slide 14 to slide 23</p>		
Activity details	Solution/Guidelines	
Run the presentation from slide 14 to slide 23		
Following are the wrap-up session deliverables:		

<ul style="list-style-type: none"> • 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
<p>How can we select the place of our choice and get details of the selected place?</p> <p>A. using cursor component B. using mouse component C. using keyboard component D. using desktop component</p>	A
<p>Which event is triggered when the cursor is hovering over the entity?</p> <p>A. mousehover B. mousestart C. mouseenter D. mousestop</p>	C
<p>Which event is triggered when the cursor is away from the entity?</p> <p>A. mouseexit B. mouseleave C. mousestop D. mousehover</p>	B
<ul style="list-style-type: none"> • End the quiz panel 	

	<p>You get a “hats-off”.</p> <p>Alright. See you in the next class.</p>	<p><i>Make sure you have given at least 2 Hats Off during the class for:</i></p> <div>  +10 Creatively Solved Activities </div> <div>  +10 Great Question </div> <div>  +10 Strong Concentration </div>
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<p>Project Overview</p>	<p>COMIC WORLD STAGE 2</p> <p>Goal of the Project:</p> <p>In this project you will add cursor events to select and deselect the thumbnail cards created in the previous class for online comic books stores using A-Frame entities and components.</p> <p>Story:</p> <p>Your friend always wanted to watch DC & MARVEL movies, but he is not getting time to watch them. He always wished to go through their comic stories online whenever he got time.</p> <p>Help him to create a virtual comics world and add the particular comics for thumbnail components for the tour to comics. Add more elements to the scene and help your friend see different thumbnails' shapes, and add your favorite comic's posters in the thumbnails.</p> <p>Write an A-Frame component to add the cursor event in the scene to select the entity on mouse hovering over the entity and deselect the entity when mouse is away from the entity.</p> <p>I am very excited to see how you would add cursor events in the scene.</p>	
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	Bye!	
<div>Teacher Clicks</div> <div>✕ End Class</div>		
Additional Activities	<p><i>Encourage the student to write reflection notes in their reflection journal using markdown.</i></p> <p>Use these as guiding questions:</p> <ul style="list-style-type: none"> • What happened today? <ul style="list-style-type: none"> ◦ Describe what happened. ◦ The code I wrote. • How did I feel after the class? • What have I learned about programming and developing games? • What aspects of the class helped me? What did I find difficult? 	<p><i>The student uses the markdown editor to write their reflections in a reflection journal.</i></p>

Activity	Activity Name	Links
Teacher Activity 1	Previous Class Code	https://github.com/whitehatjr/PRO-C157-Teacher-Ref
Teacher Activity 2	Reference code	https://github.com/whitehatjr/PRO-C158-Teacher-Ref
Student Activity 1	Boilerplate code	https://github.com/whitehatjr/PRO-C158-Student-Activity
Project Solution	Comic World Stage 2	https://github.com/whitehatjr/PRO-C158-Project-Solution
Teacher Ref. Visual	Visual Aid link	https://curriculum.whitehatjr.com/Vi

Aid Link		sual+Project+Asset/PRO_VD/PRO_C158_withcues.html
Teacher Ref. In-Class Quiz	In-Class Quiz	https://s3-whjr-curriculum-uploads.whjr.online/a62911c0-ef27-44be-b59c-d14a819e3fc8.pdf

