PRO-C164

A-Frame NAVIGATION MESHES

What is our GOAL for this MODULE?

We learned to create navigation meshes models and to use the motion control component to walk the A-Frame virtual environment scene.

What did we ACHIEVE in the class TODAY?

- Learned to create navigation meshes.
- Learned about the A-Frame movement component.

Which CONCEPTS/CODING BLOCKS did we cover today?

- Visual Inspector tool, gLTF Viewer.
- A-Frame movement control component.
- A-Frame inspector plugin.
- A-Frame navmesh.

How did we DO the activities?

1. Use <Ctrl+Alt+i> keys together to open the Visual Inspector tool.

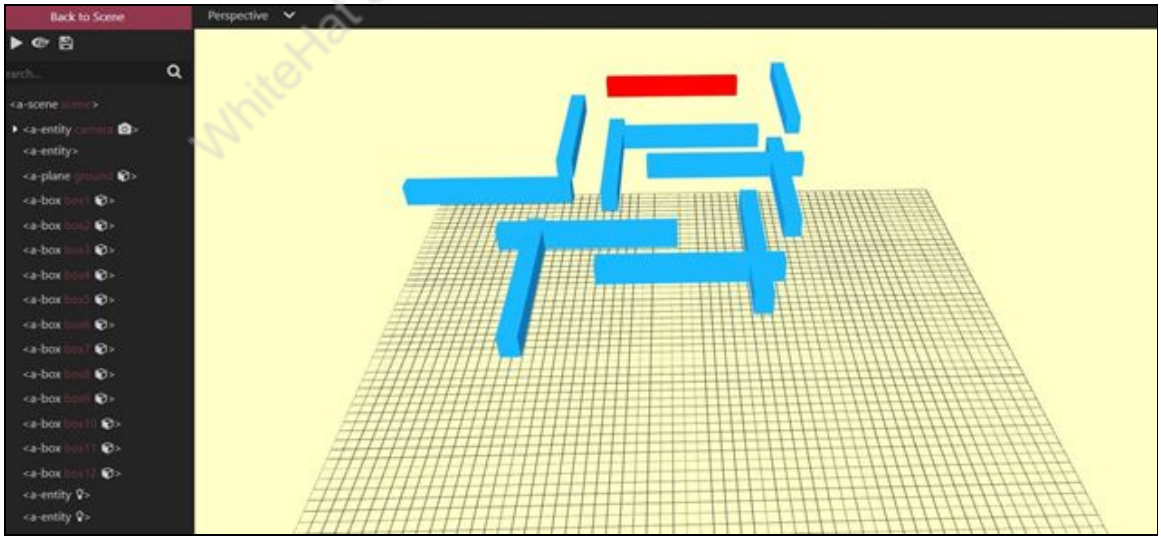
```
<a-scene id="scene">
  <!--Camera and Cursor-->
  <a-entity id="camera" camera position="0 1.6 0" wasd-controls="acceleration:200"
    look-controls="pointerLockEnabled: false">
    <a-cursor></a-cursor>
  </a-entity>

  <!--Bullets-->
  <a-entity bullets></a-entity>

  <!--Ground-->
  <a-plane id="ground" position="0 0 0" rotation="-90 0 0" height="200" width="200"
    color="#FBF2B0" static-body visible="true">
  </a-plane>

  <!--Boxes-->
  <a-box id="box1" position="0 0.5 -6.33437" color="#16A2F6" depth="1" height="1.5" width="10"></a-box>
  <a-box id="box2" position="-5.63047 0.5 -9.65585" color="#16A2F6" depth="1" height="1.5" width="10"></a-box>
  <a-box id="box3" position="2.5 0.5 -17.4559" color="#16A2F6" depth="1" height="1.5" width="10"></a-box>
  <a-box id="box4" position="0 0.5 -21.58323" color="#16A2F6" depth="1" height="1.5" width="10"></a-box>
  <a-box id="box5" position="-12.01326 0.5 -14.59535" color="#16A2F6" depth="1" height="1.5" width="10"></a-box>
  <a-box id="box6" position="-7.73232 0.5 -22.17969" color="#16A2F6" depth="10" height="1.5" width="1"></a-box>
  <a-box id="box7" position="-8.54977 0.5 -5.3525" color="#16A2F6" depth="10" height="1.5" width="1"></a-box>
  <a-box id="box8" position="-4.67013 0.5 -18.0932" color="#16A2F6" depth="10" height="1.5" width="1"></a-box>
  <a-box id="box9" position="5.90667 0.5 -15" color="#16A2F6" depth="10" height="1.5" width="1"></a-box>
  <a-box id="box10" position="3.59768 0.5 -8.18822" color="#16A2F6" depth="10" height="1.5" width="1"></a-box>
  <a-box id="box11" position="7.63783 0.5 -28.06952" color="#16A2F6" depth="10" height="1.5" width="1"></a-box>
  <a-box id="box12" position="-0.82929 0.5 -30.18869" color="red" depth="1" height="1.5" width="10"></a-box>

</a-scene>
```



2. Create the navmesh:
    - Add the “aframe-inspector-plugin-recast” library link in index.html.

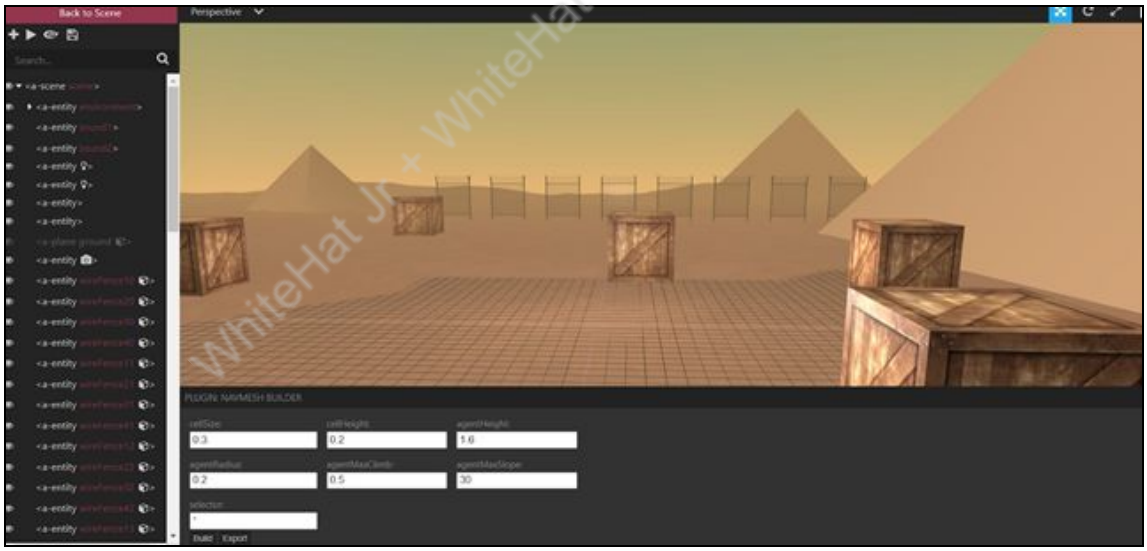
```
<script src="https://recast-api.donmccurdy.com/aframe-inspector-plugin-recast.js"></script>
```

    - Use the “inspector-plugin-recast” component of the library.

```
<a-scene id="scene" inspector-plugin-recast>

  <!--Assets-->
  <a-assets>
    <a-asset-item id="shooter" src="./models/shooter/gun.gltf"></a-asset-item>
```

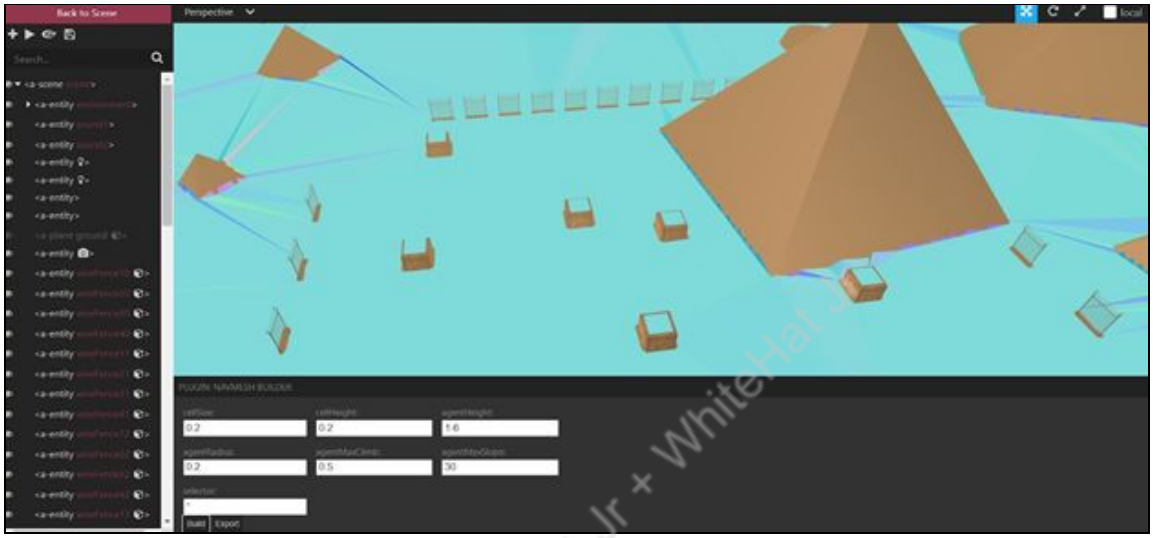
    - Open the Visual Inspector tool.



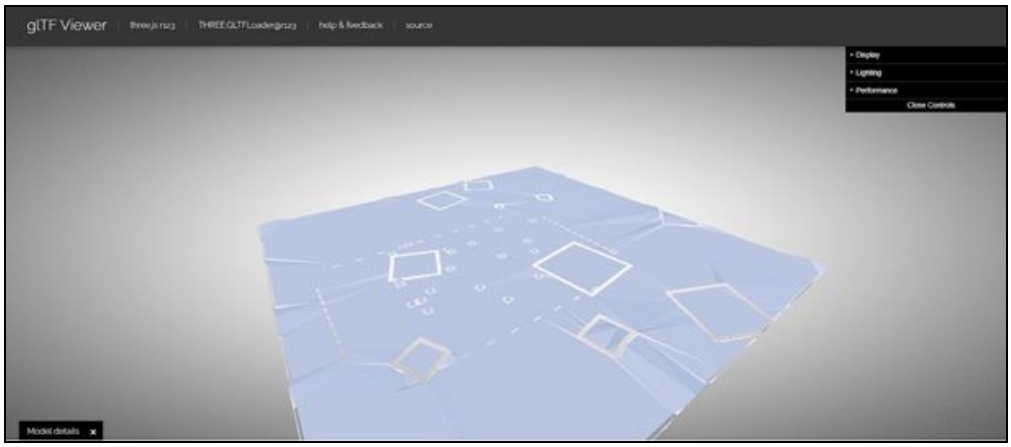
3. Comment the camera entity in the code for now and open Visual Inspector again.

```
<!--Camera and Cursor-->
<!-- <a-entity id="camera" camera position="0 1.6 0" wasd-controls="acceleration:200"
  look-controls="pointerLockEnabled: false">
  <a-cursor></a-cursor>
</a-entity> -->
```

4. Create a gLTF model file of navmesh download and copy the file into your working folder.



5. Use gLTF viewer to see how navmesh looks after it has been converted to a gLTF file.



6. Attach the “nav-mesh” component to the “gltf-model” entity to make the navmesh model work.

```
<a-assets>
  <a-asset-item id="shooter" src="./models/shooter/gun.gltf"></a-asset-item>
  <a-asset-item id="collider" src="./models/navmesh.gltf"></a-asset-item>
  <audio id="shoot" src="./sounds/shoot.mp3"></audio>
  <audio id="footstep" src="./sounds/footStep.mp3"></audio>

</a-assets>
```

```
<!-- Navigation Mesh -->
<a-entity id="navigation-mesh" gltf-model="#collider" visible="true" nav-mesh>
</a-entity>
```

7. Use the “movement-controls” component which is a part of “ aframe-extras” library to move around:

   - Add the library.

```
<script
src="https://cdn.jsdelivr.net/gh/donmccurdy/aframe-extras@v6.1.1/dist/aframe-extras.min.js">
</script>
```

   - Create a movement-controls entity with the camera as its child.

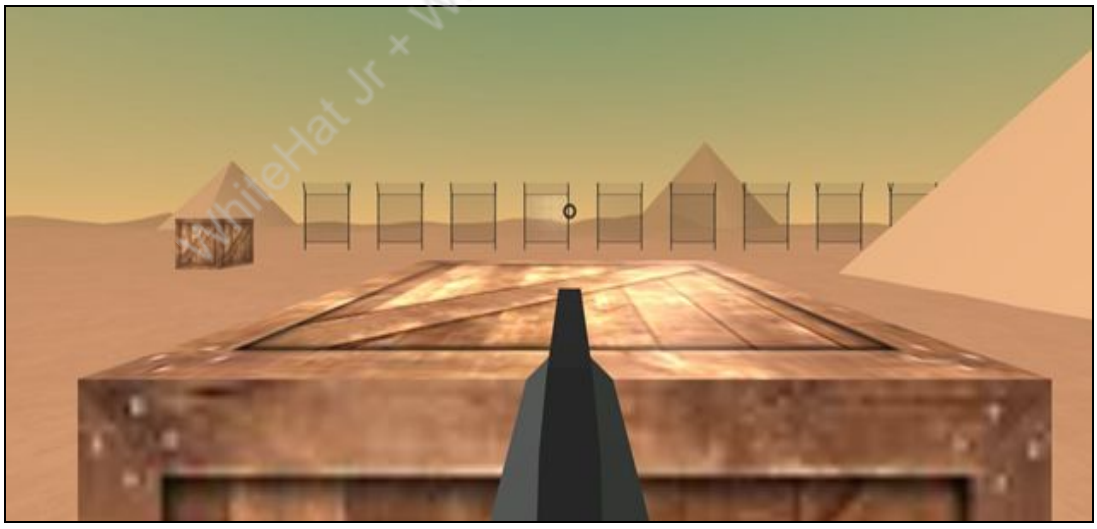
```
<a-entity movement-controls="speed: 0.2; constrainToNavMesh: true" position="0 1 2">
  <!--Camera and Cursor-->
  <a-entity id="camera" camera position="0 1.6 0" look-controls="pointerLockEnabled: false">
    <a-entity id="weapon" gltf-model="#shooter" position="0 -4.4 3" rotation="0 180 0" scale="0.35 1 1"
      player-movement>
    </a-entity>
    <a-cursor></a-cursor>
  </a-entity>
</a-entity>
```

- Set the visible attribute of navmesh to false.

```
<!-- Navigation Mesh -->
<a-entity id="navigation-mesh" gltf-model="#collider" visible="false" nav-mesh>
</a-entity>
```

- Adjust the dimensions of the boxes to avoid the gun model from entering into the box.

```
schema: {
  height: { type: "number", default: 2 },
  width: { type: "number", default: 2 },
  depth: { type: "number", default: 2 },
},
```



8. Give id to movement-controls entity and use that to adjust the bullet shooting position in the shoot.js file.

```
<a-entity id="camera-rig" movement-controls="speed: 0.2; constrainToNavMesh: true" position="0 1 2">
  <!--Camera and Cursor-->
  <a-entity id="camera" camera position="0 1.6 0" look-controls="pointerLockEnabled: false">
    <a-entity id="weapon" gltf-model="#shooter" position="0 -4.4 3" rotation="0 180 0" scale="0.35 1 1"
      player-movement>
    </a-entity>
    <a-cursor></a-cursor>
  </a-entity>
</a-entity>
```

```
var cam = document.querySelector("#camera-rig");
pos = cam.getAttribute("position");

bullet.setAttribute("position", {
  x: pos.x,
  y: pos.y+1,
  z: pos.z-0.5,
});
```

We have successfully learned to create navmesh of the A-Frame scene.

What's NEXT?

In the next class, we will learn to find out vector direction for the enemies to shoot at the player.

EXTEND YOUR KNOWLEDGE:

- You can refer to the below link to explore more about AFrame.
  A-Frame
- You can refer to the link below to explore more about A-Frame inspector plugin.
  aframe-inspector-plugin-recast
- You can refer to the below link to explore more about A-Frame extras.
  aframe-extras
- You can refer to the link below to explore more about gLTF Viewer.
  gLTF Viewer