



A virtual tour to Augmented and Virtual Reality

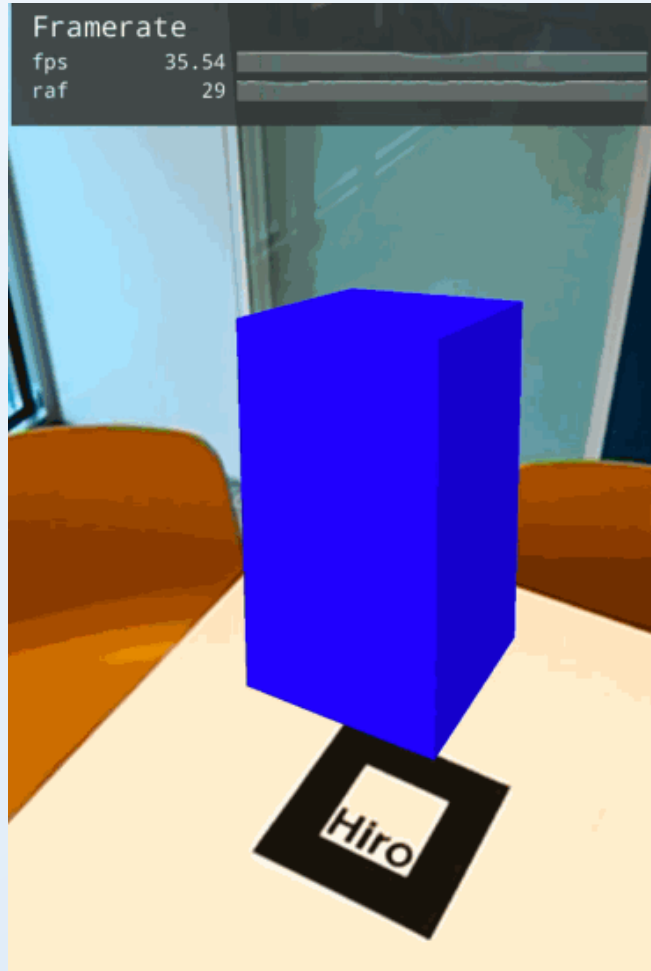
Dr. Sarwan Singh
NIELIT Chandigarh



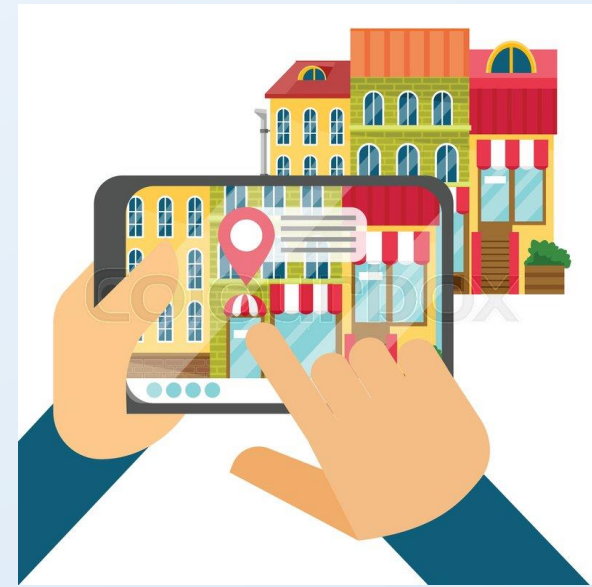


Agenda

- A-Frame: Marker
 - Hiro Marker
 - Custom marker



*Write AR.js app
once and run on
all platforms*



*Underneath,
A-Frame is an entity-component
framework for three.js that is
exposed declaratively.*





References

Websites :

- developers.google.com/ar,
- dev.to/arunkumarvallal, mobidev.biz,
gerardfriel.com/ar/the-history-of-ar
- [Aframe.io](https://aframe.io), theodo.com

Books

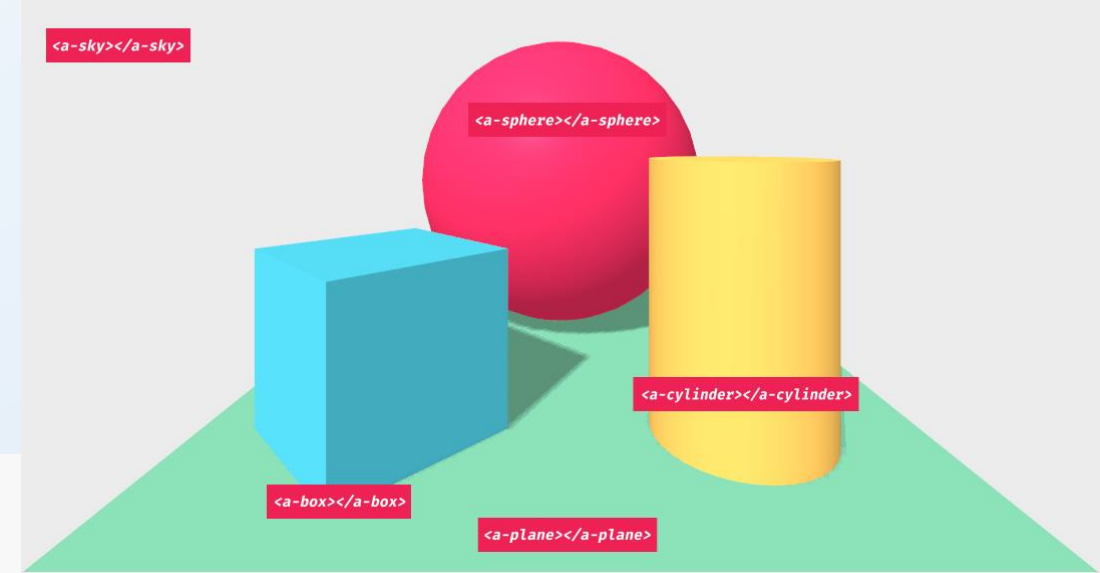
- “Theory and applications of marker-based augmented reality” – Sanni Siltanen
- “Computer graphics”- Hearn and Baker





First code

```
<html>
<head>
<script src="https://aframe.io/releases/0.9.2/aframe.min.js"></script>
</head>
<body>
  <a-scene>
    <a-box position="-1 0.5 -3" rotation="0 45 0" color="#4CC3D9"></a-box>
    <a-sphere position="0 1.25 -5" radius="1.25" color="#EF2D5E"></a-sphere>
    <a-cylinder position="1 0.75 -3" radius="0.5" height="1.5" color="#FFC65D"></a-cylinder>
    <a-plane position="0 0 -4" rotation="-90 0 0" width="4" height="4" color="#7BC8A4"></a-plane>
    <a-sky color="#ECECEC"></a-sky>
  </a-scene>
</body>
</html>
```





Marker based AR

```
<html>
```

```
<head>
```

```
<script src="https://aframe.io/releases/0.6.1/aframe.min.js"></script>
```

```
<script src="https://rawgit.com/donmccurdy/aframe-extras/master/dist/aframe-extras.loaders.min.js"></script>
```

```
<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/build/aframe-ar.js"></script>
```

```
</head>
```

```
<body style='margin : 0px; overflow: hidden;'>
```

```
<a-scene stats embedded arjs='trackingMethod: best;'>
```

```
<a-marker preset="hiro">
```

```
<a-box position='0 1 0' material='color: blue;'> </a-box>
```

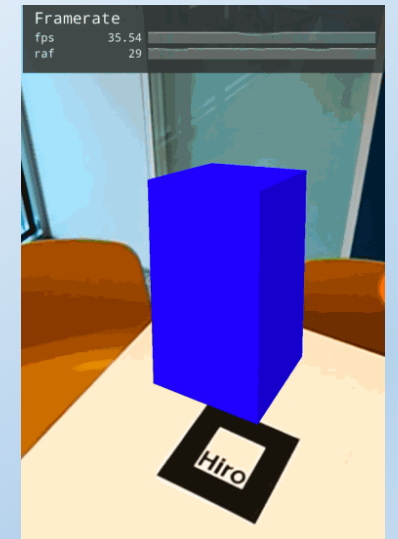
```
</a-marker>
```

```
<a-entity camera></a-entity>
```

```
</a-scene>
```

```
</body>
```

```
</html>
```





Practical – Hands on

```
<html>
```

```
<head>
```

```
<script src="https://aframe.io/releases/0.6.1/aframe.min.js"></script>
```

```
<script src="https://rawgit.com/donmccurdy/aframe-extras/master/dist/aframe-extras.loaders.min.js"></script>
```

```
<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/build/aframe-ar.js"> </script>
```

```
</head>
```

```
<body style='margin : 0px; overflow: hidden;'>
```

```
<a-scene embedded arjs='sourceType: webcam;'>
```

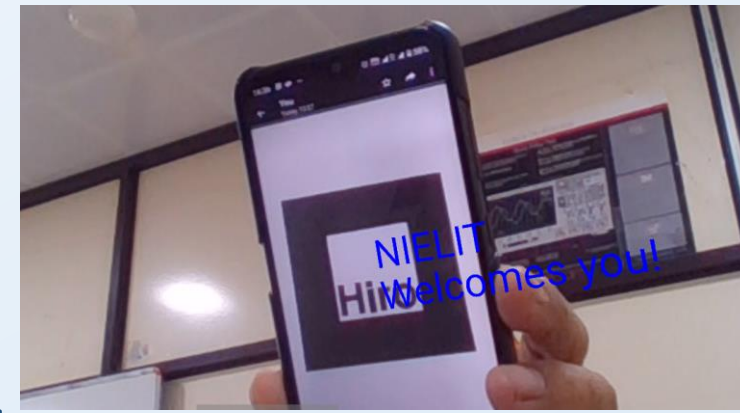
```
<a-text text="value: NIELIT \n Welcomes you!" color="blue" rotation="-90 0 0"></a-text>
```

```
<a-marker-camera preset='hiro'></a-marker-camera>
```

```
</a-scene>
```

```
</body>
```

```
</html>
```





Import Library

- import A-Frame library

```
<script src="https://aframe.io/releases/0.6.1/aframe.min.js"></script>
```

- import ARjs, the web-framework for augmented reality

```
<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/build/aframe-ar.js"> </script>
```



Initialize the scene

- A-Frame works using a scene that contains the elements the user wants to display. To create a new scene `<a-scene>` tag is used

```
<a-scene stats embedded arjs='trackingMethod: best; debugUIEnabled: false'>  
<!-- All our components goes here -->  
</a-scene>
```

- stats : it displays stats about your application performance.
- arjs : some basic ARjs configuration.
 - trackingMethod is the type of camera tracking you use, here we have chosen which is an auto configuration that will be great for our example.
 - debugUIEnabled is set at false in order to remove debugging tools from the camera view.



Shape

- A-frame is built around a generic component `<a-entity>` tag
- `<a-box>` has a lot of attributes :

```
<a-box position="0 0 0" rotation="0 0 0"></a-box>
```

- position : the three coordinates that will be used to position our components
- rotation : that color of the shape



Marker

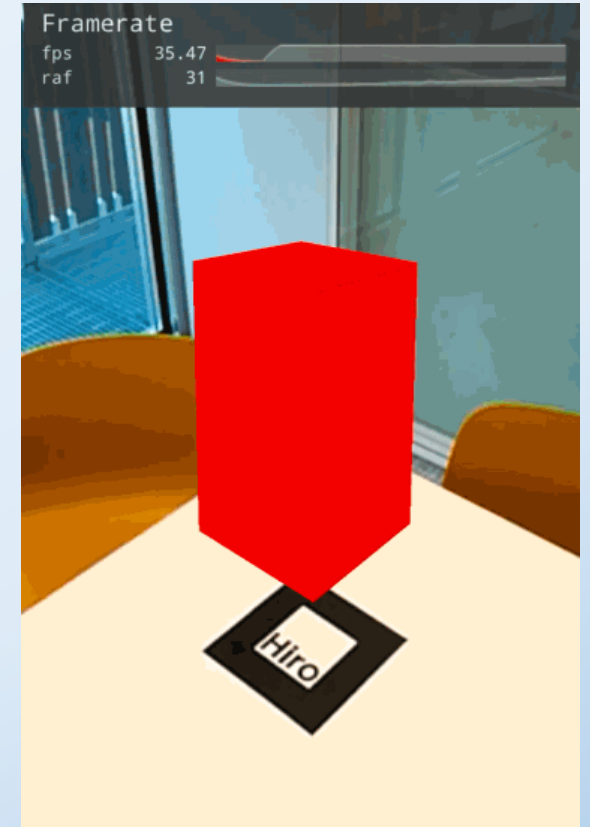
- use a Hiro marker to start
- *It is a special kind of marker designed for augmented reality*
- It is possible to have custom marker.





Animation

- A-frame contains a component `<a-animation>` that has been designed to animate an entity.
- Has attributes of our entity such as position, rotation, scale or even color.
 - `dur` : duration of the animation
 - `from` : start position or state of the animation
 - `to` : end position or state of the animation
 - `repeat` : if and how the animation should be repeated





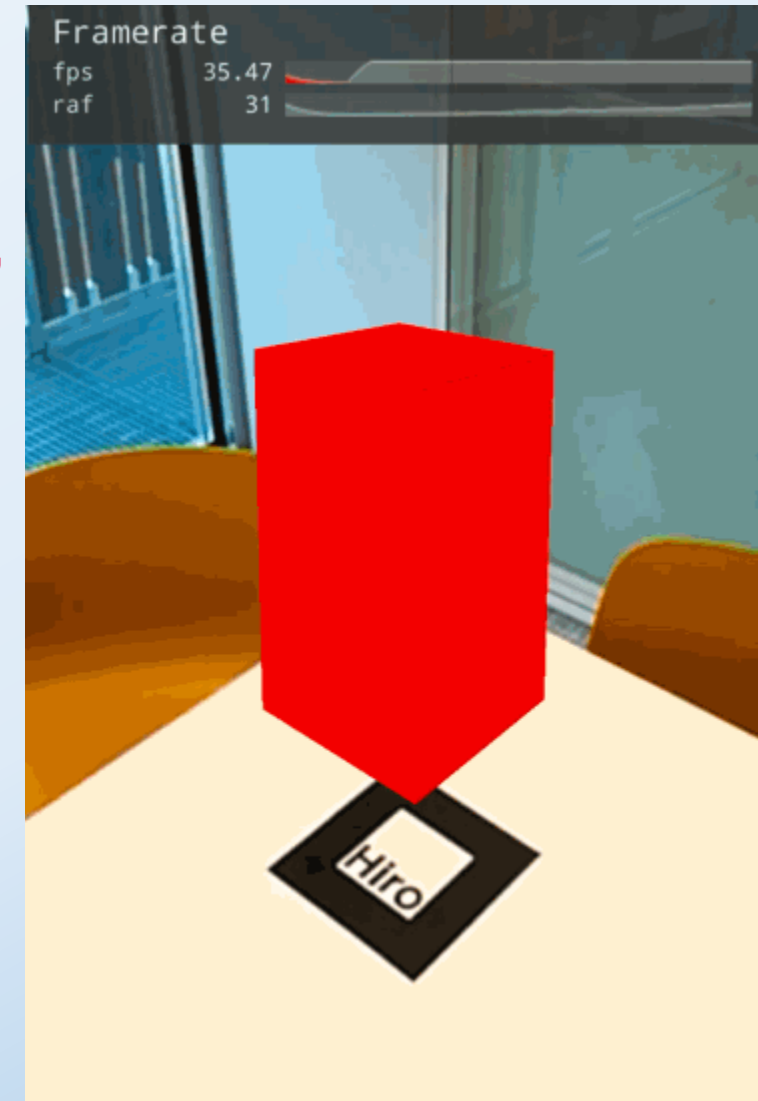
Adding Animation

```
<a-animation  
  attribute="rotation"  
  dur="2000"  
  from="0 0 0"  
  to="360 0 0"  
  repeat="indefinite">
```

```
</a-animation>
```

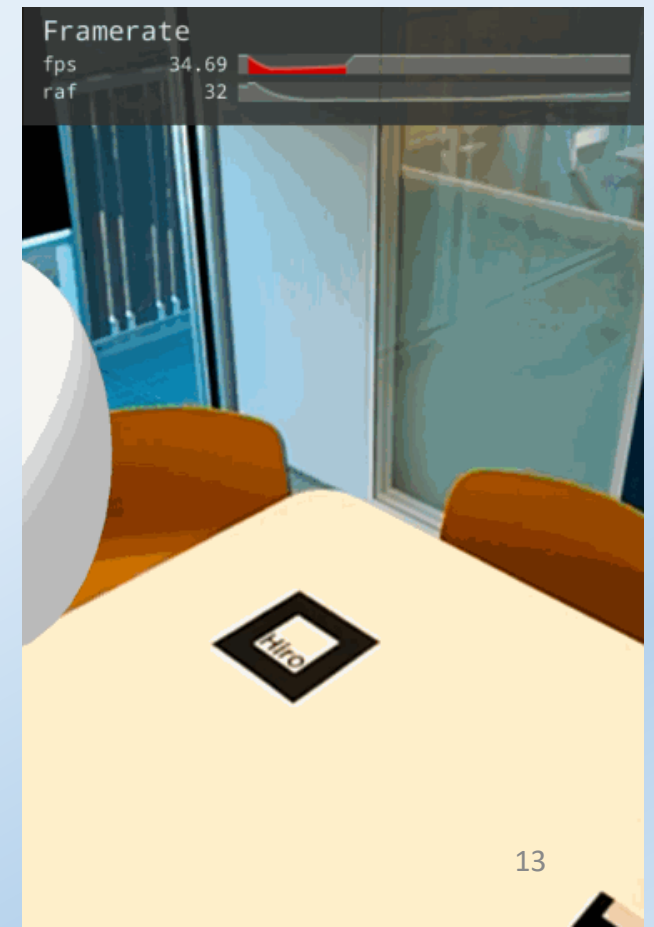
```
<a-animation  
  attribute="position"  
  dur="1000"  
  from="1 0 0"  
  to="0 0 1">
```

```
</a-animation>
```





```
<html>
<script src="https://aframe.io/releases/0.6.1/aframe.min.js"></script>
<script src="https://rawgit.com/donmccurdy/aframe-extras/master/dist/aframe-extras.loaders.min.js"></script>
<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/build/aframe-ar.js"> </script>
<body style='margin : 0px; overflow: hidden;'>
  <a-scene stats embedded arjs='trackingMethod: best; debugUIEnabled: false'>
    <a-assets>
      <a-asset-item id="avocado" src="https://cdn.rawgit.com/KhronosGroup/glTF-Sample-Models/9176d098/1.0/Avocado/glTF/Avocado.gltf"></a-asset-item>
    </a-assets>
    <a-marker preset="hiro">
      <a-entity>
        <a-animation attribute="rotation"      dur="2000"      easing="linear"
          from="0 0 0"      to="0 360 0"      repeat="indefinite"></a-animation>
        <a-entity rotation="0 0 25">
          <a-sphere position="2 0 2"></a-sphere>
        </a-entity>
      </a-entity>
    </a-marker>
    <a-entity camera>
  </a-entity>
</a-scene>
</body>
</html>
```





Model loading

- load a 3D model inside ARjs and project it on a marker

```
<a-assets>
```

```
  <a-asset-item id="smiley" src="https://cdn.rawgit.com/KhronosGroup/glTF-Sample-Models/9176d098/ 1.0/SmilingFace/glTF/SmilingFace.gltf"></a-asset-item>
```

```
</a-assets>
```

```
<a-entity gltf-model="#smiley" rotation= "180 0 0">  
</a-entity>
```




<html>

<script src="https://aframe.io/releases/0.6.1/aframe.min.js"></script>

<script src="https://rawgit.com/donmccurdy/aframe-extras/master/dist/aframe-extras.loaders.min.js"></script>

<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/build/aframe-ar.js"> </script>

<body style='margin : 0px; overflow: hidden;'

<a-scene embedded arjs='trackingMethod: best;'

<a-assets>

<a-asset-item id="smiley" src="https://cdn.rawgit.com/KhronosGroup/glTF-Sample-Models/9176d098/1.0/SmilingFace/glTF/SmilingFace.glTF"></a-asset-item>

</a-assets>

<a-marker preset="hiro">

<a-entity gltf-model="#smiley" rotation= "180 0 0">

</a-entity>

</a-marker>

<a-entity camera></a-entity>

</a-scene>

</body>

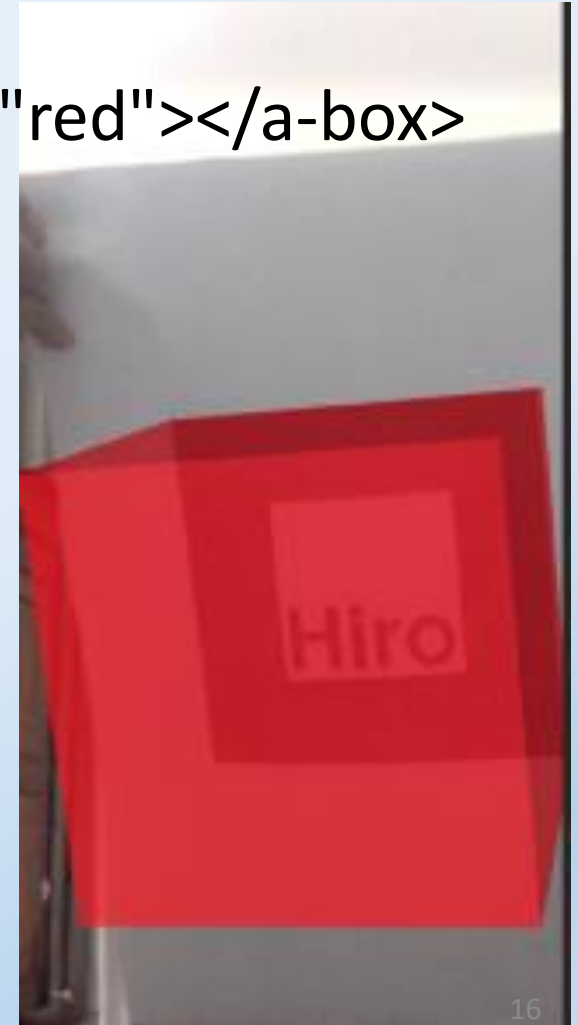
</html>





Changing opacity

```
<body style='margin : 0px; overflow: hidden;'>  
<a-scene embedded arjs='sourceType: webcam;'>  
<a-box position='0 0.5 0' material='opacity: .7;' color='red'></a-box>  
<a-marker-camera preset='hiro'></a-marker-camera>  
</a-scene>  
</body>
```





```
<body style='margin : 0px; overflow: hidden;'  
  <a-scene embedded arjs='sourceType: webcam;'  
    <a-entity  
      rotation="-90 0 0"  
      geometry="primitive: plane; width: 4; height: auto"  
      material="color: blue"  
      text="value: NIELIT Chandigarh\n Ropar Campus"></a-entity>  
    <a-image src="https://cdn.glitch.me/a12f687b-43cb-4e58-ba35-  
0be05e2dce21%2Fnielit.png?v=1633433466066" rotation="-90 0 0"></a-  
image>  
    <a-marker-camera preset='hiro'></a-marker-camera>  
  </a-scene>  
</body>
```

