

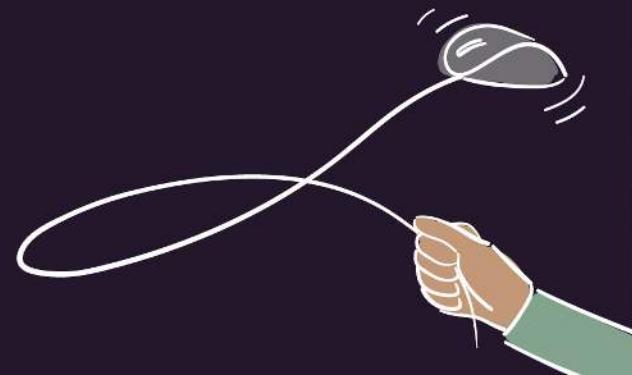
CLIENT  
TECHNOLOGY  
DAYS

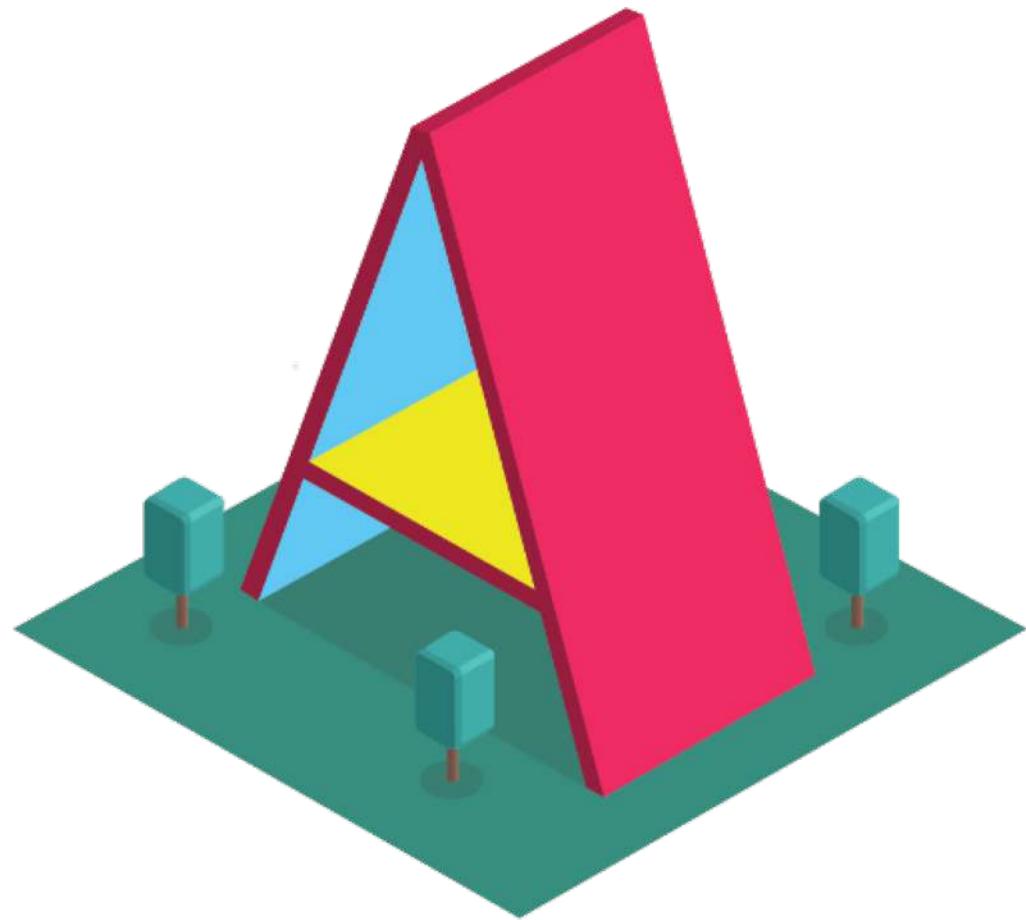
SCHLIEREN  
27. & 28. SEPTEMBER 2017



# Virtual Reality with JavaScript

A-Frame – Lukas Akermann







Zühlke Cubes (Firefox)





Zühlke Cubes (HTC Vive)

# Zühlke Cubes

```
<html>
<head>
    <script src="scripts/aframe-0.6.1.min.js"></script>
    <script src="scripts/aabb-collider.js"></script>
    <script src="scripts/grab.js"></script>
</head>
<body>
<a-scene>
    <a-assets>
        
        <a-mixin id="cube" geometry="primitive: box;" material="src:#zmaterial;"></a-mixin>
        <a-mixin id="cube-collided" material="color: #F2E646;"></a-mixin>
        <a-mixin id="cube-grabbed" material="color: #F2E646;"></a-mixin>
    </a-assets>

    <!-- Hands -->
    <a-entity hand-controls="left" aabb-collider="objects: .cube;" grab></a-entity>
    <a-entity hand-controls="right" aabb-collider="objects: .cube;" grab></a-entity>

    <!-- Objects -->
    <a-entity class="cube" mixin="cube" position="-1 0.5 -3" rotation="0 45 0"></a-entity>
    <a-entity class="cube" mixin="cube" position="0 0.5 -5" rotation="0 20 0"></a-entity>
    <a-entity class="cube" mixin="cube" position="1 0.5 -3" rotation="0 0 0"></a-entity>
    <a-plane position="0 0 -4" rotation="-90 0 0" width="4" height="4" color="#7BC8A4"></a-plane>
</a-scene>
</body>
</html>
```

**Libraries**

# Zühlke Cubes

```
<html>
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    <script src="scripts/aframe-0.6.1.min.js"></script>
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**Libraries**

**Scene**

# Zühlke Cubes

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</body>
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```

**Libraries**

**Scene**

**- Assets**

# Zühlke Cubes

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<html>
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</a-scene>
</body>
</html>
```

**Libraries**

**Scene**

**- Assets**

**- Entity Hierarchy**

# Paraglider Simulator - Sky

```
<html>
<head>
    <script src="scripts/aframe-0.6.1.min.js"></script>
</head>
<body>
<a-scene>
    <a-assets>
        
    </a-assets>

    <!-- Sky -->
    <a-sky src="#sky"></a-sky>

    <!-- Camera -->
    <a-entity camera look-controls wasd-controls></a-entity>

</a-scene>
</body>
</html>
```

Sky

# Paraglider Simulator - Sky

```
<html>
<head>
  <script src="scripts/aframe-0.6.1.min.js"></script>
</head>
<body>
<a-scene>
  <a-assets>
    
  </a-assets>

  <!-- Sky -->
  <a-sky src="#sky"></a-sky>

  <!-- Camera -->
  <a-entity camera look-controls wasd-controls></a-entity>

</a-scene>
</body>
</html>
```

Sky

Camera



Sky (Firefox)  
KIIRA (<https://opengameart.org/content/sky-box-sunny-day>)

# Paraglider Simulator - Terrain

Texture



Colour



Satellite

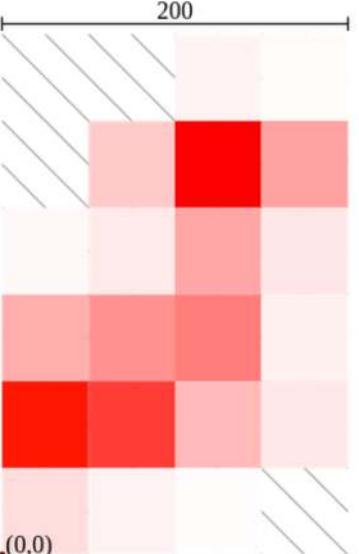


Crop

[Federal Office of Topography swisstopo]

# Paraglider Simulator - Terrain

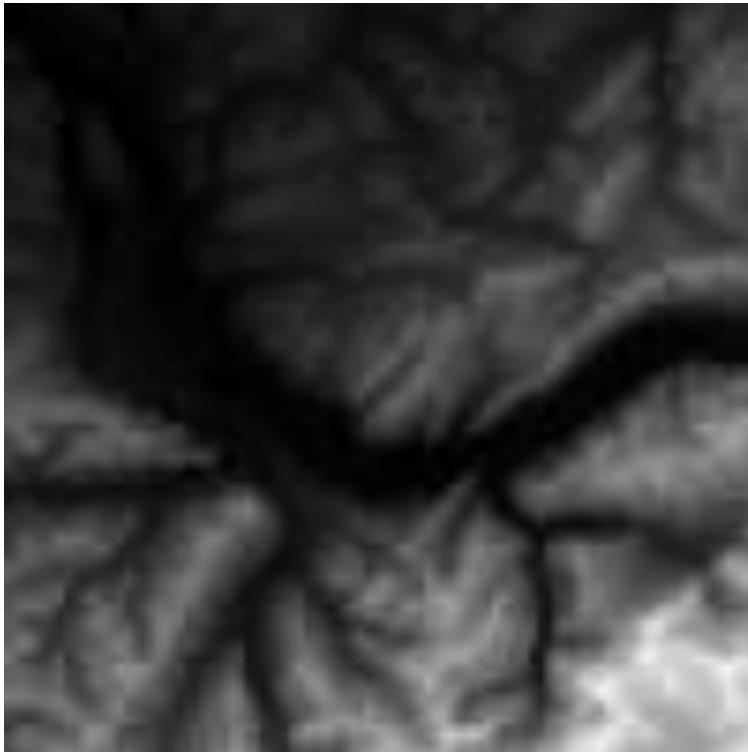
## Elevation Model

Grid image	Values					ASCII grid format
	25	75	125	175		
275	NA	NA	5	2		ncols 4
225	NA	20	100	36		nrows 6
175	3	8	35	10		xllcorner 0.0
125	32	42	50	6		yllcorner 0.0
75	88	75	27	9		cellsize 50.0
25	13	5	1	NA		NODATA_value -9999
						-9999 -9999 5 2
						-9999 20 100 36
						3 8 35 10
						32 42 50 6
						88 75 27 9
						13 5 1 -9999

[[https://en.wikipedia.org/wiki/Esri\\_grid](https://en.wikipedia.org/wiki/Esri_grid)]

# Paraglider Simulator - Terrain

Elevation Model



[Federal Office of Topography swisstopo]

# Paraglider Simulator - Terrain

```
<html>
<head>
    <script src="scripts/aframe-0.6.1.min.js"></script>
    <script src="scripts/aframe-terrain-model-component-0.2.3.min.js"></script>
</head>
<body>
<a-scene>
    <a-assets>
        
    </a-assets>

    <!-- Sky -->
    <a-sky src="#sky" position="0 -700 0"></a-sky>

    <!-- Camera -->
    <a-entity camera look-controls wasd-controls></a-entity>

    <!-- Terrain -->
    <a-entity terrain-model="DEM: url(data/DHM200_bernese_oberland.bin);
        texture: url(data/DHM200_bernese_oberland.jpg);
        planeWidth: 5000; planeHeight: 5000; segmentsWidth: 199; segmentsHeight: 199; zPosition: 370;" 
        position="-620 -190 -1065" rotation="0 75 0"></a-entity>

</a-scene>
</body>
</html>
```

Terrain Loader

# Paraglider Simulator - Terrain

```
<html>
<head>
    <script src="scripts/aframe-0.6.1.min.js"></script>
    <script src="scripts/aframe-terrain-model-component-0.2.3.min.js"></script>
</head>
<body>
<a-scene>
    <a-assets>
        
    </a-assets>

    <!-- Sky -->
    <a-sky src="#sky" position="0 -700 0"></a-sky>

    <!-- Camera -->
    <a-entity camera look-controls wasd-controls></a-entity>

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    <a-entity terrain-model="DEM: url(data/DHM200_bernese_oberland.bin);
        texture: url(data/DHM200_bernese_oberland.jpg);
        planeWidth: 5000; planeHeight: 5000; segmentsWidth: 199; segmentsHeight: 199; zPosition: 370;">
        position="-620 -190 -1065" rotation="0 75 0"></a-entity>
</a-scene>
</body>
</html>
```

**Terrain Loader**

**Terrain Model**



Terrain (Firefox)

Texture / Elevation Model: Federal Office of Topography swisstopo

# Paraglider Simulator - Paraglider

## Model



# Paraglider Simulator - Paraglider

```
...
<a-scene>
  <a-assets>
    
    <a-asset-item id="paraglider-model" src="data/paraglider.gltf"></a-asset-item>
  </a-assets>

  <!-- Sky -->
  <a-sky src="#sky" position="0 -700 0"></a-sky>

  <!-- Camera -->
  <a-entity camera="userHeight: 0.5" look-controls wasd-controls></a-entity>

  <!-- Paraglider -->
  <a-entity gltf-model="#paraglider-model" scale="0.88 0.88 0.88" rotation="10 0 0"></a-entity>

  <!-- Terrain -->
  <a-entity terrain-model="DEM: url(data/DHM200_bernese_oberland.bin);
    texture: url(data/DHM200_bernese_oberland.jpg);
    planeWidth: 5000; planeHeight: 5000; segmentsWidth: 199; segmentsHeight: 199; zPosition: 370;" 
    position="-620 -190 -1065" rotation="0 75 0"></a-entity>

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

**Asset**

# Paraglider Simulator - Paraglider

```
...
<a-scene>
  <a-assets>
    
    <a-asset-item id="paraglider-model" src="data/paraglider.gltf"></a-asset-item>
  </a-assets>

  <!-- Sky -->
  <a-sky src="#sky" position="0 -700 0"></a-sky>

  <!-- Camera -->
  <a-entity camera="userHeight: 0.5" look-controls wasd-controls></a-entity>

  <!-- Paraglider -->
  <a-entity gltf-model="#paraglider-model" scale="0.88 0.88 0.88" rotation="10 0 0"></a-entity> Model

  <!-- Terrain -->
  <a-entity terrain-model="DEM: url(data/DHM200_bernese_oberland.bin);
    texture: url(data/DHM200_bernese_oberland.jpg);
    planeWidth: 5000; planeHeight: 5000; segmentsWidth: 199; segmentsHeight: 199; zPosition: 370;" 
    position="-620 -190 -1065" rotation="0 75 0"></a-entity>

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

**Asset**

**Model**

# Paraglider Simulator - Paraglider

```
...
<a-scene>
  <a-assets>
    
    <a-asset-item id="paraglider-model" src="data/paraglider.gltf"></a-asset-item>
  </a-assets>

  <!-- Sky -->
  <a-sky src="#sky" position="0 -700 0"></a-sky>

  <!-- Camera -->
  <a-entity camera="userHeight: 0.5" look-controls wasd-controls></a-entity> User height

  <!-- Paraglider -->
  <a-entity gltf-model="#paraglider-model" scale="0.88 0.88 0.88" rotation="10 0 0"></a-entity> Model

  <!-- Terrain -->
  <a-entity terrain-model="DEM: url(data/DHM200_bernese_oberland.bin);
    texture: url(data/DHM200_bernese_oberland.jpg);
    planeWidth: 5000; planeHeight: 5000; segmentsWidth: 199; segmentsHeight: 199; zPosition: 370;" 
    position="-620 -190 -1065" rotation="0 75 0"></a-entity>

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



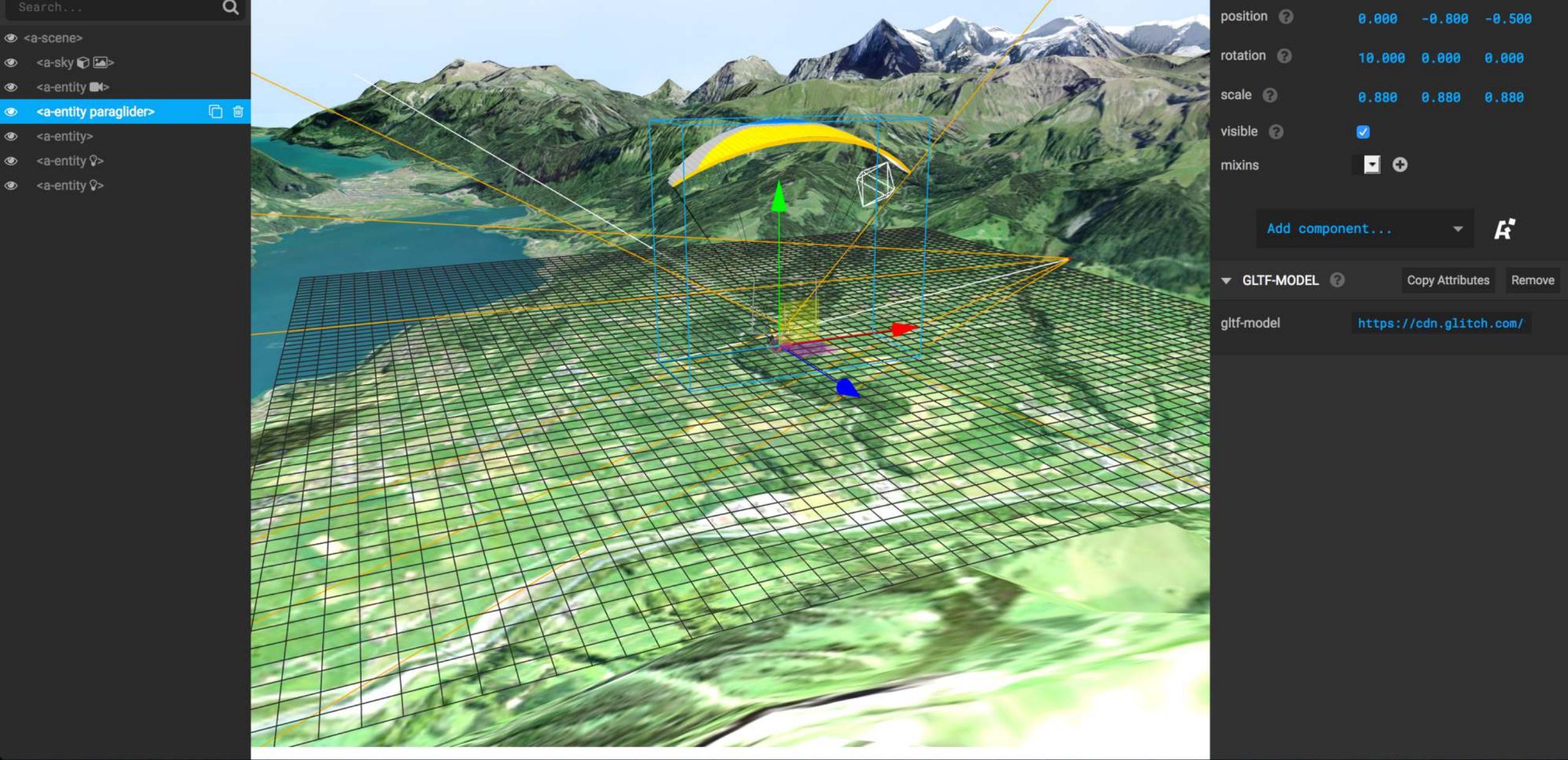
Paraglider (Firefox)

Model: Raphael T. (<https://3dwarehouse.sketchup.com/collection/c166a0a48065f4403a426bad1ca64772/real-life-paraglides>)



Paraglider (Firefox)

Model: Raphael T. (<https://3dwarehouse.sketchup.com/collection/c166a0a48065f4403a426bad1ca64772/real-life-paraglides>)



A-Frame Inspector (Firefox)

# Paraglider Simulator - Animation

```
...
<a-scene>
  ...
  <a-entity>
    <!-- Camera -->
    <a-entity camera="userHeight: 0.5; near: 0.1;" look-controls wasd-controls></a-entity>

    <!-- Paraglider -->
    <a-entity gltf-model="#paraglider-model" scale="0.88 0.88 0.88" rotation="10 0 0"></a-entity>
    <a-animation attribute="position"
      dur="30000"
      easing="linear"
      to="0 -180 -1600"
      delay="2000">
    </a-animation>
  </a-entity>
  ...
</a-scene>
...
```

**Wrap Entities**

# Paraglider Simulator - Animation

```
...
<a-scene>
  ...
  <a-entity>
    <!-- Camera -->
    <a-entity camera="userHeight: 0.5; near: 0.1;" look-controls wasd-controls></a-entity>

    <!-- Paraglider -->
    <a-entity gltf-model="#paraglider-model" scale="0.88 0.88 0.88" rotation="10 0 0"></a-entity>
    <a-animation attribute="position"
      dur="30000"
      easing="linear"
      to="0 -180 -1600"
      delay="2000">
    </a-animation>
  </a-entity>
  ...
</a-scene>
...
```

**Wrap Entities**

**Animation**



Animation (Firefox)

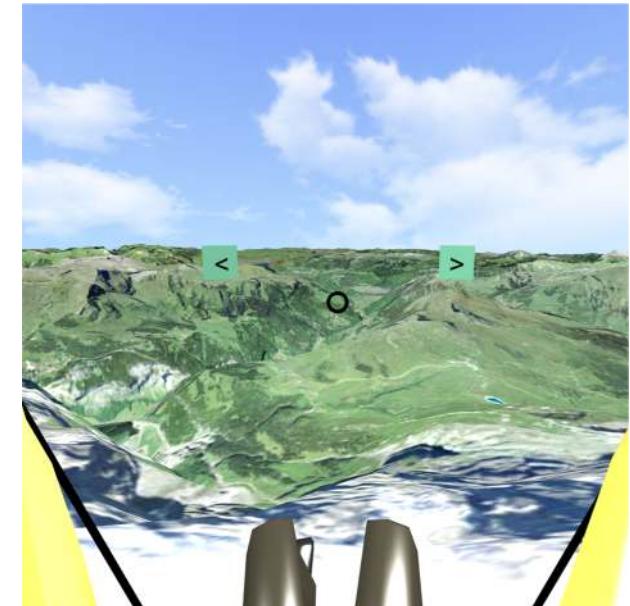
# Paraglider Simulator - Next Steps



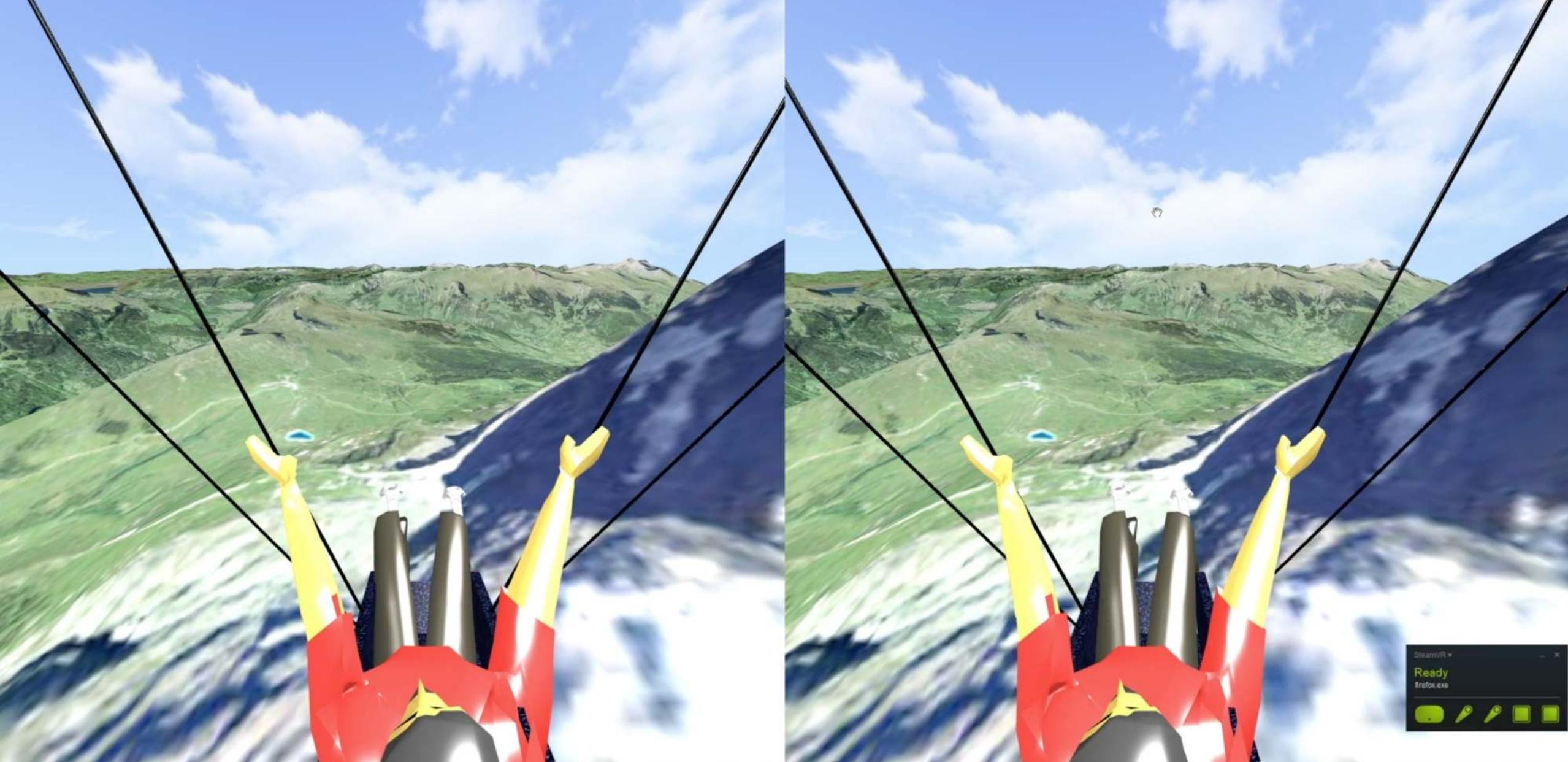
Menus



Collision Detection



Controllers



Demo (HTC Vive)