

ГУАП

КАФЕДРА № 44

ОТЧЕТ
ЗАЩИЩЕН С ОЦЕНКОЙ
ПРЕПОДАВАТЕЛЬ

доцент

должность, уч. степень, звание

подпись, дата

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ОТЧЕТ О ЛАБОРАТОРНОЙ РАБОТЕ №2

Создание динамических X3D-сцен

по курсу: ИНТЕРАКТИВНАЯ КОМПЬЮТЕРНАЯ ГРАФИКА

РАБОТУ ВЫПОЛНИЛ

СТУДЕНТ ГР. №

4142

подпись, дата

К.С. Некрасов

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Санкт-Петербург 2023

Вариант 14

Цель работы

Целью работы является приобретение навыков создания динамических X3D- сцен с использованием сенсоров и интерполяторов различных типов, а также с применением обработки DOM-событий на языке JavaScript в коде HTML- страницы. Установка источников освещения и задание способов навигации X3D- сцен.

Индивидуальное задание

Интерполяторы

1. ScalarIntepolator
2. ColorInterpolator
3. OrientationInterpolator

Сенсоры

1. TimeSensor
2. TouchSensor
3. SphereSensor

Скрипты Javascript

1. Script

Источники освещения, камера, навигация

1. DirectionalLight
2. Spotlight
3. Viewpoint
4. NavigationInfo

Код сцены

index.html

```
<!DOCTYPE html>
<html lang="ru">

<head>
  <meta charset="utf-8" />
  <title> Lab2 X3DOM </title>
```

```

<script src="https://www.x3dom.org/download/dev/x3dom-full.js"></script>
<link rel='stylesheet' type='text/css' href='https://www.x3dom.org/download/x3dom.css'>
<style>
  x3d {
    border: 3px solid #050505;
    background-image: url('background.jpg');
  }

  body {
    font-size: 100%;
    font-family: verdana, sans-serif;
    background-color: antiquewhite;
    color: black;
  }

  h1 {
    color: darkblue;
  }
</style>
</head>

<body>
  <h1> Некрасов К.С. ЛР2 4142 </h1>
  <p>
    Это html-страница с 3d-объектами.
  </p>
  <x3d width='800px' height='600px'>
    <scene>
      <ScalarInterpolator DEF='SCALAR_INTERPOLATOR' key='0 0.25 0.5 0.75 1' keyValue='0.4'>
        </ScalarInterpolator>
      <ColorInterpolator DEF='COLOR_INTERPOLATOR' key='0 0.25 0.5 0.75 1' keyValue='0 1 0'>
        </ColorInterpolator>
      <DirectionalLight id="directional" direction='0 -1 -1' on="TRUE" intensity='0.4'>
        </DirectionalLight>

      <!-- ----- -->
      <!-- Viewpoints -->
      <!-- ----- -->
      <!-- general ----- -->
      <Viewpoint id="general" position="-14.09116 8.14736 20.40598" orientation="-0.3674

```

```

zNear="0.00739" zFar="73.93107" centerOfRotation="0.00000 0.00000 0.00000" field
  description="defaultX3DViewpointNode">
</Viewpoint>
<!-- ----- down ----- -->
<Viewpoint id="down" position="-8.09880 1.06916 0.98377" orientation="0.29863 -0.9
  zNear="0.00739" zFar="73.93107" centerOfRotation="0.00000 0.00000 0.00000" field
  description="defaultX3DViewpointNode">
</Viewpoint>
<!-- ----- -->
<!--                               /Viewpoints                               -->
<!-- ----- -->

<!-- ----- Navigation info ----- -->
<NavigationInfo avatarSize='[ 0.25, 1.6, 0.75 ]' bind='true' description='""' expl
  headlight='true' isActive='false' metadata='X3DMetadataObject' reverseScroll='fa
  transitionTime='1.0' transitionType='["LINEAR"]' type='["EXAMINE","ANY"]' typePa
  visibilityLimit='0.0' walkDamping='2.0'></NavigationInfo>
<!-- ----- /NavigationInfo ----- -->

<!--table-->
<transform rotation='1,0,0, -1.5'>
  <shape>
    <appearance>
      <Texture DEF='sand_texture' url="sand.jpg"></Texture>
      <material DEF='sand_color' diffuseColor='1 0.643 0.1'></material>
      <material diffuseColor='0 1 0'></material>
    </appearance>
    <plane size='50 50'></plane>
  </shape>
</transform>

<!--moon-->
<transform DEF="MOON" translation="15 15 -5">
<SphereSensor DEF='SPHERE_SENSOR' description='click and drag to rotate'> </Spher
  <shape>
    <appearance>
      <imagetexture DEF='steel_texture' url="steel.jpg"></imagetexture>
    </appearance>
    <sphere radius="4"></sphere>
  </shape>

```

</transform>

```
<Group DEF="clouds">
```

```
<transform translate="0 0 0">
```

<Shape>

```
<IndexedTriangleStripSet ccw='true' colorPerVertex='false' index='0 1 2 3 4 5 0  
solid='false' containerField='geometry'>
```

```
<Coordinate point='0.5 6 0 2 6 3 5 6 5 6 6 7 1 6 12 -1 6 3'> </Coordinate>
```

<Color color="0 0 1"> </Color>

</IndexedTriangleStripSet>

</Shape>

 $\langle \text{transform} \rangle$

```
<transform translate="0 0 0">
```

<Shape>

```
<IndexedTriangleStripSet ccw='true' colorPerVertex='false' index='0 1 2 3 4 5 0  
    solid='false' containerField='geometry'>
```

```
<Coordinate point='-3 5 -1 -2 5 -3 -5 5 5 1 5 2 0 5 2 -1 5 3'> </Coordinate>
```

<Color color="0 0 1"> </Color>

</IndexedTriangleStripSet>

</Shape>

 $\langle \text{transform} \rangle$

</Group>

```
<!-- pyramid2 -->
```

```
<Transform translation='-2'>
```

<Shape>

<Appearance>

```
<Material USE="sand_texture"> </Material>
```

</Appearance>

```
<Extrusion crossSection='-1 0 0 2 1 0 -1 0' solid='false'></Extrusion>
```

</Shape>

</Transform>

```
<!--pyramid-->
```

```
<transform translation='0 .5 0'>
```

<shape>

<appearance>

```
<imagetexture USE='sand_texture'></imagetexture>
```

```

        <material USE='sand_color'></material>
    </appearance>
    <pyramid></pyramid>
</shape>
</transform>

<!--UFO-->
<transform translation="0 3 0">
<TouchSensor DEF='TOUCH' description='touch to activate'></TouchSensor>
    <!--UFO-->
    <Group>
        <!-- ship -->
        <transform translation="0 0 0">
            <Inline url="ufo.x3d"> </Inline>
        </transform>
        <!--lazer-->
        <transform translation="-0.3 -1.5 -0.2">
            <shape>
                <appearance>
                    <PixelTexture image="3 2 3
0xFF0000 0x00FF00 0x0000FF
0xFFFF00 0xFF00FF 0x00FFFF"> </PixelTexture>
                </appearance>
                <snout height="3"></snout>
            </shape>
        </transform>
        <!-- light -->
        <transform translation="0 1 0" rotation="1 0 0 -1.5">
<SpotLight DEF="LIGHT" beamWidth='0.9' intensity='0.9' shadowIntensity='0.9'
            radius='50.0000'>
        </SpotLight>
        </transform>
    </Group>

</transform>

<!-- text -->
<transform translation="-10 3 -7">
    <Anchor url="'./ufo.x3d'">
        <shape isPickable='true'>

```

```

    <Text string='"Неопознанный" - "Летающий" - "Объект"' solid='false'>
      <FontStyle family="MONOSPACE" size='1' spacing='1' language='ru'></FontStyle>
    </Text>
    <Appearance>
      <Material diffuseColor='0 0.7 0'></Material>
    </Appearance>
  </shape>
</Anchor>
</transform>

  <TimeSensor DEF='TIME' cycleInterval='5'> </TimeSensor>
  <ROUTE fromNode='TOUCH' fromField='touchTime' toNode='TIME' toField='startTime'> </ROUTE>
  <ROUTE fromNode='SPHERE_SENSOR' fromField='rotation_changed' toNode='MOON' toField='rotation'> </ROUTE>
  <ROUTE fromNode='TIME' fromField='fraction_changed' toNode='COLOR_INTERPOLATOR' toField='value'> </ROUTE>
  <ROUTE fromNode='TIME' fromField='fraction_changed' toNode='SCALAR_INTERPOLATOR' toField='value'> </ROUTE>
  <ROUTE fromField='value_changed' fromNode='SCALAR_INTERPOLATOR' toField='intensity'> </ROUTE>
  <ROUTE fromNode='COLOR_INTERPOLATOR' fromField='value_changed' toNode='LIGHT' toField='color'> </ROUTE>
</scene>
</x3d>

<button id="bottom-sight-btn"> Вид снизу </button>
<button id="main-sight-btn"> Основной вид </button>

<script>
  function focusDownSight() {
    document.querySelector('#down').setAttribute('set_bind', true)
  }
  function focusGeneralSight() {
    document.querySelector('#general').setAttribute('set_bind', true)
  }
  const bottomSightBtn = document.querySelector("#bottom-sight-btn");
  const generalSightBtn = document.querySelector("#main-sight-btn");
  bottomSightBtn.addEventListener("click", focusDownSight);
  generalSightBtn.addEventListener("click", focusGeneralSight);
</script>
</body>

</html>

```