



3D плеер на WebGL

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Artec Group

@lik04ka

MoscowJS 21

Содержание

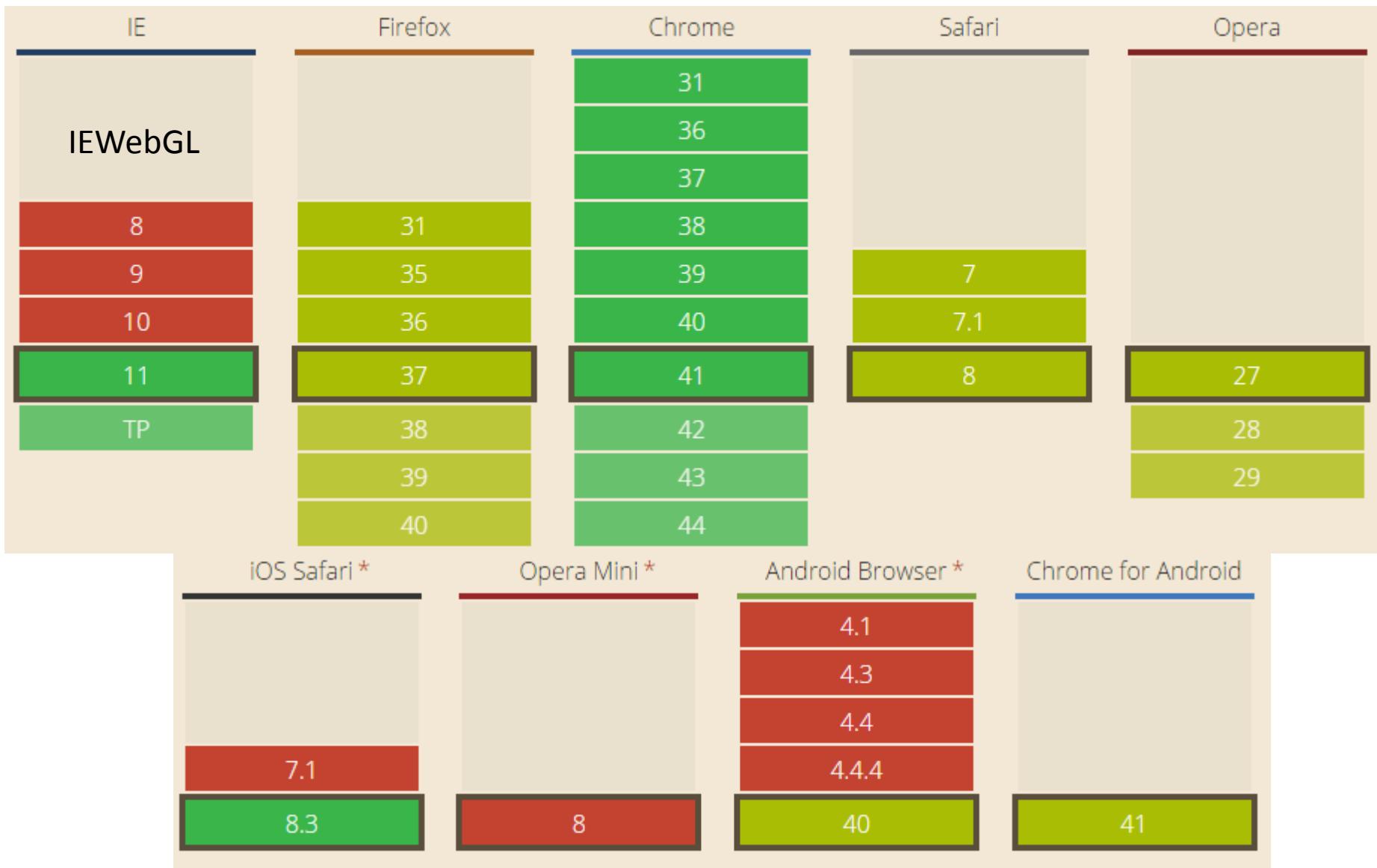
- ❖ Применение WebGL
- ❖ Преимущества
- ❖ Основные понятия 3D графики
- ❖ Библиотека Three.js
- ❖ Плеер для просмотра 3D моделей

WebGL

- HTML5 <canvas>
- OpenGL ES 2.0
- GLSL ES
- 2D/3D



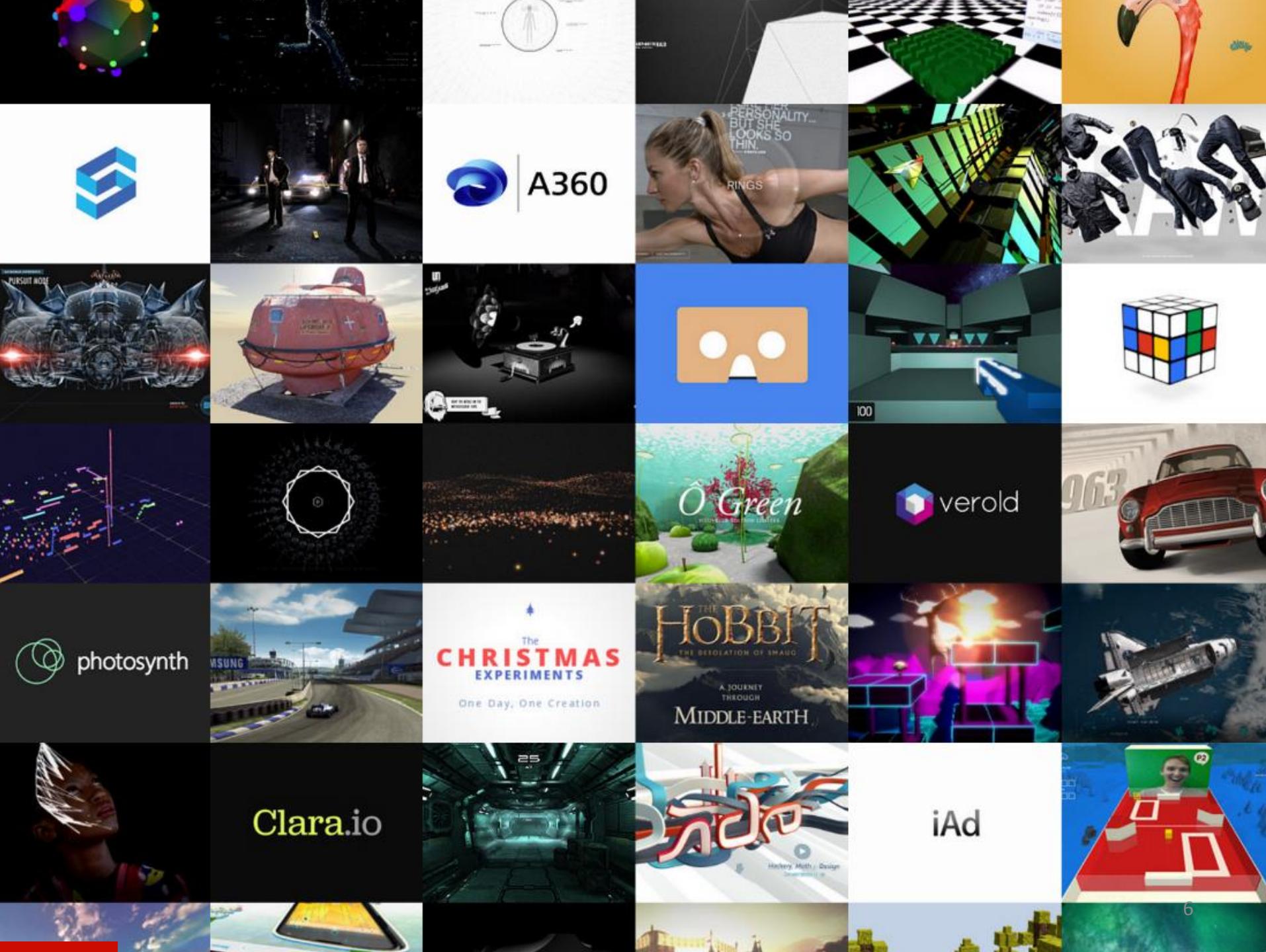
caniuse.com/webgl

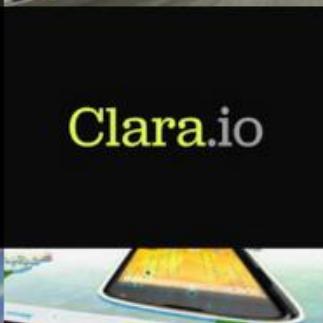
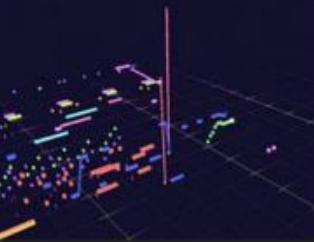
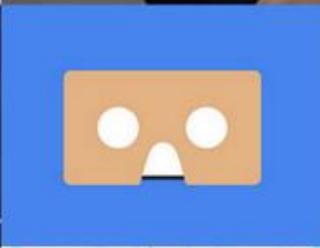
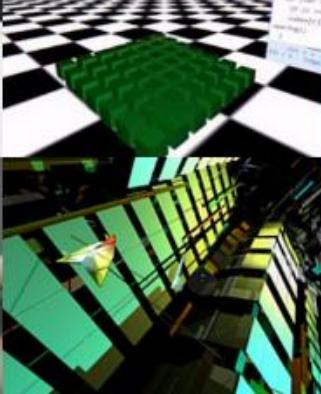


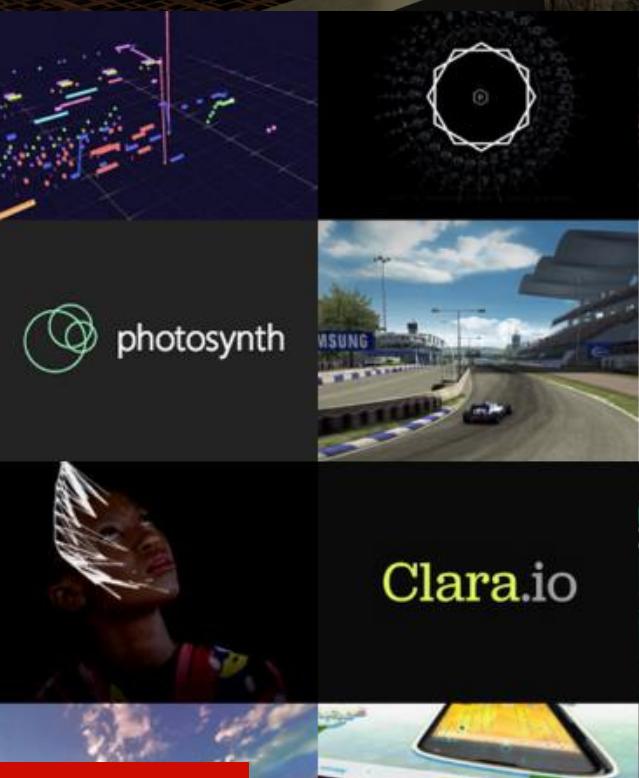
Игры



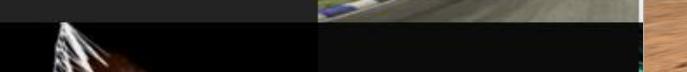
gooengine.com/pearl-boy

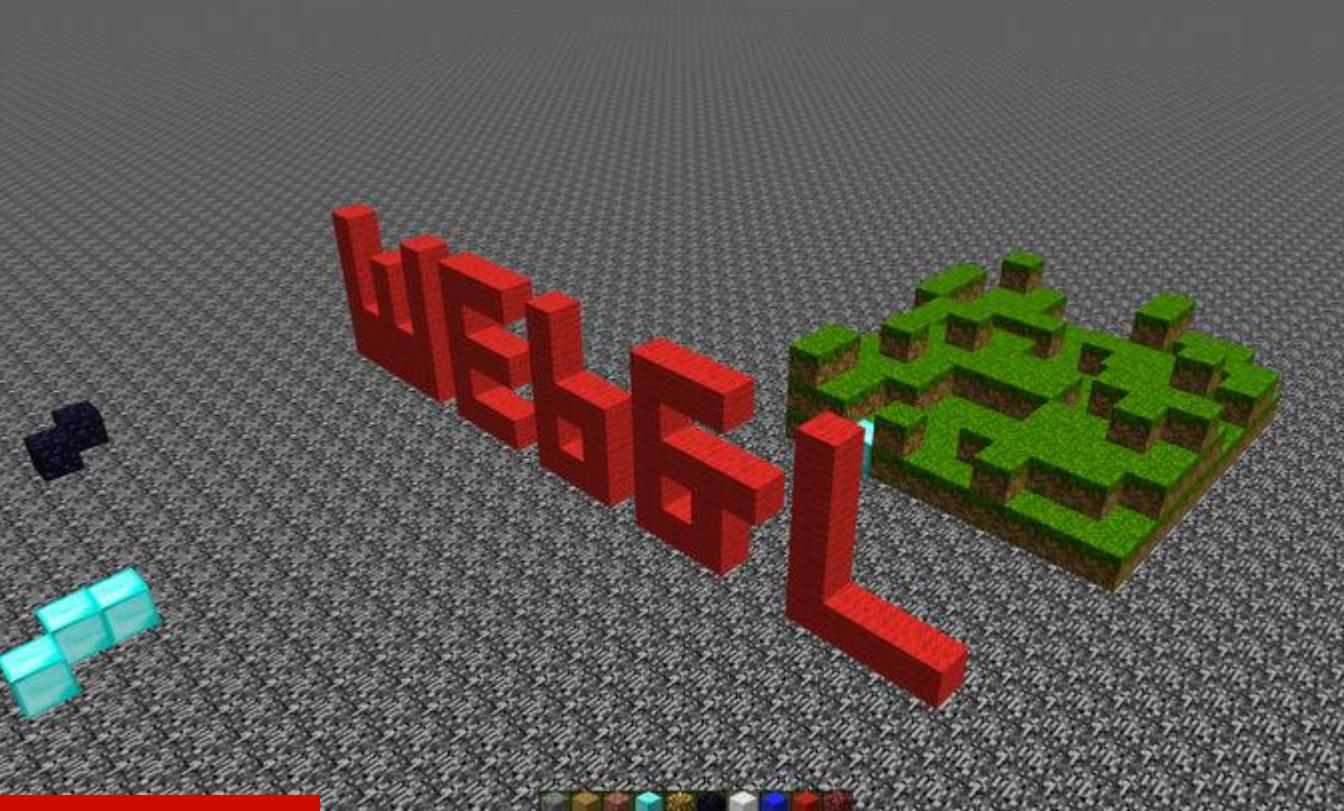






SCORE: 1/5/0

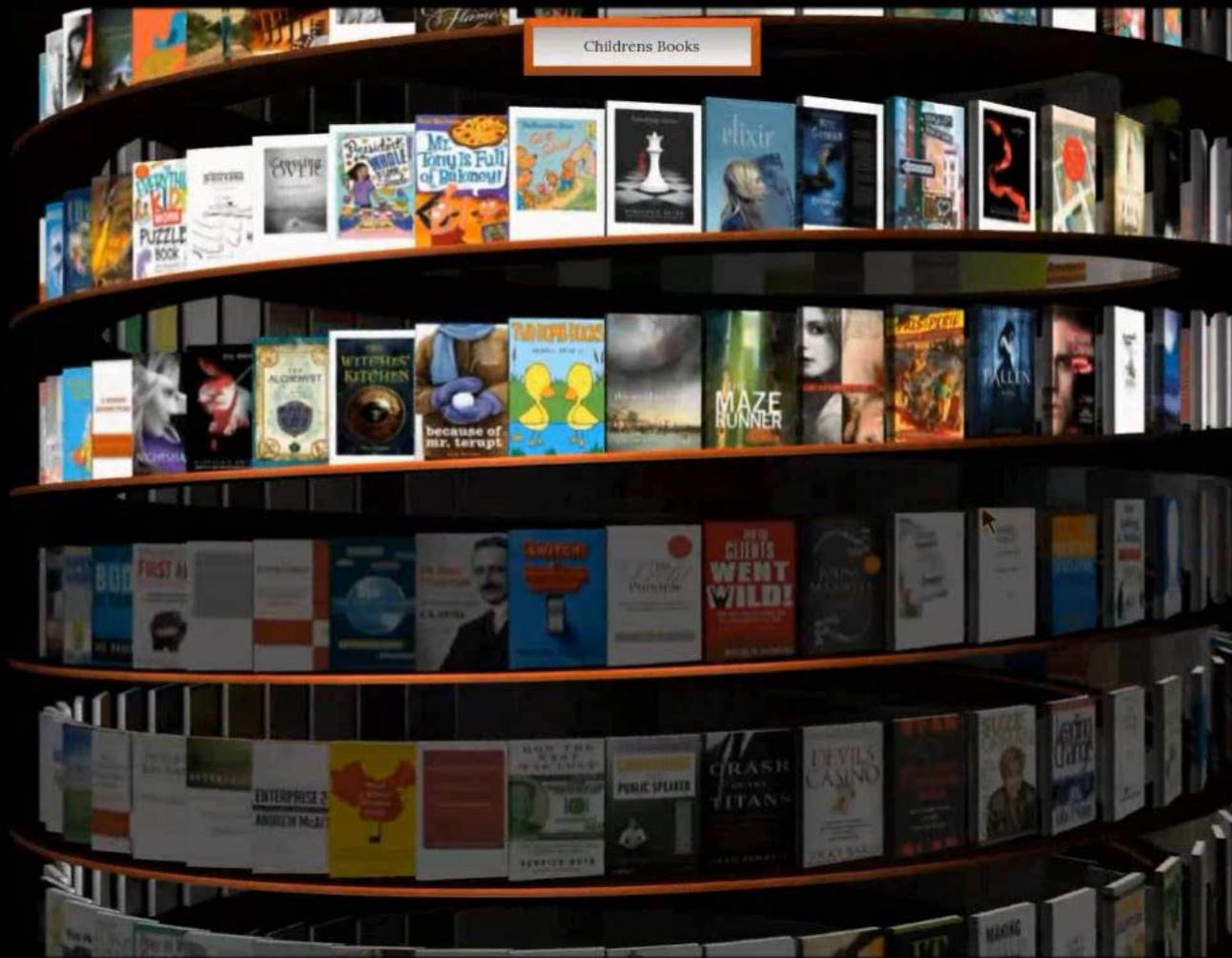




Welcome and play offline.

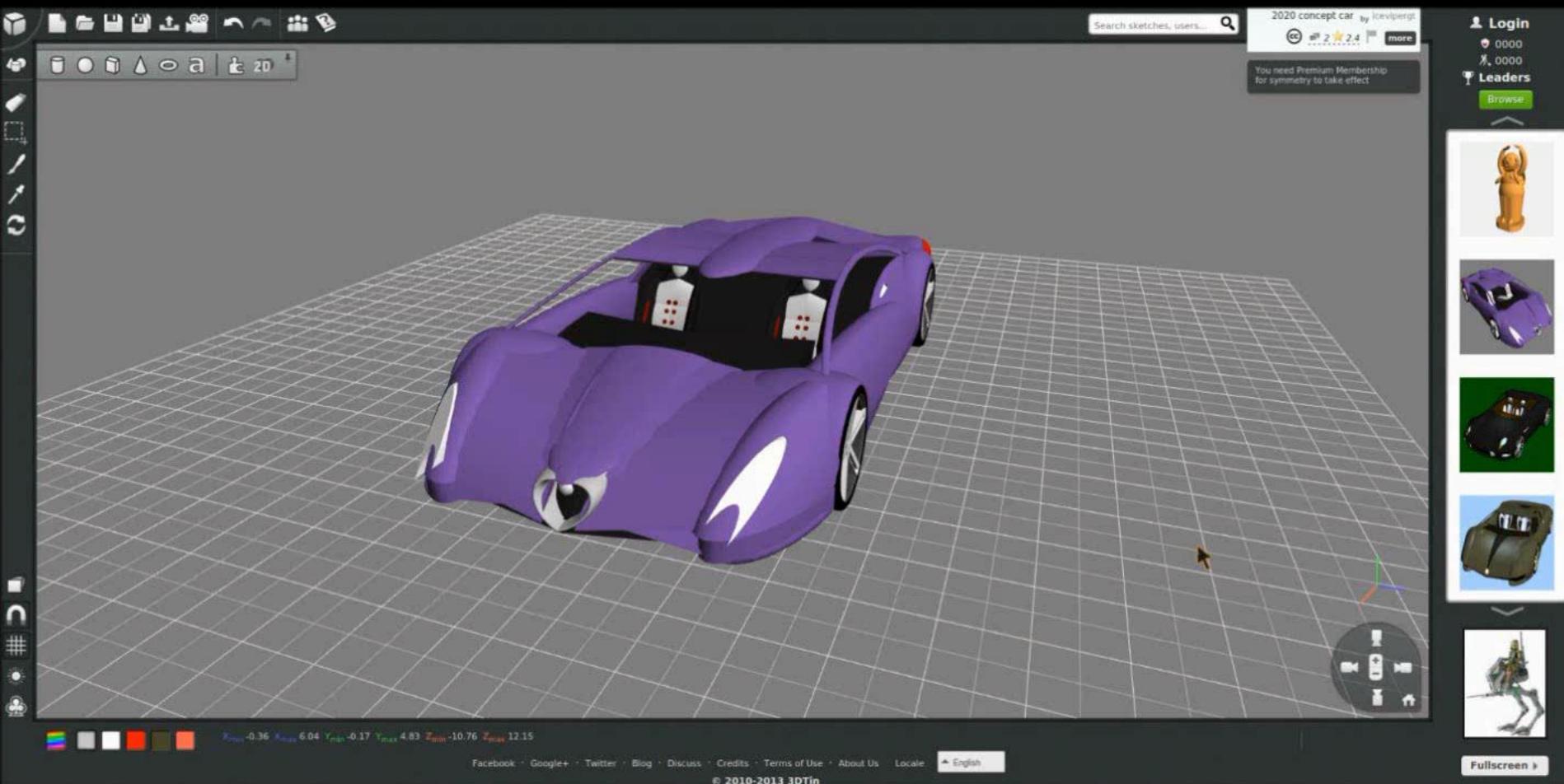


Навигация



bookcase.chromeexperiments.com

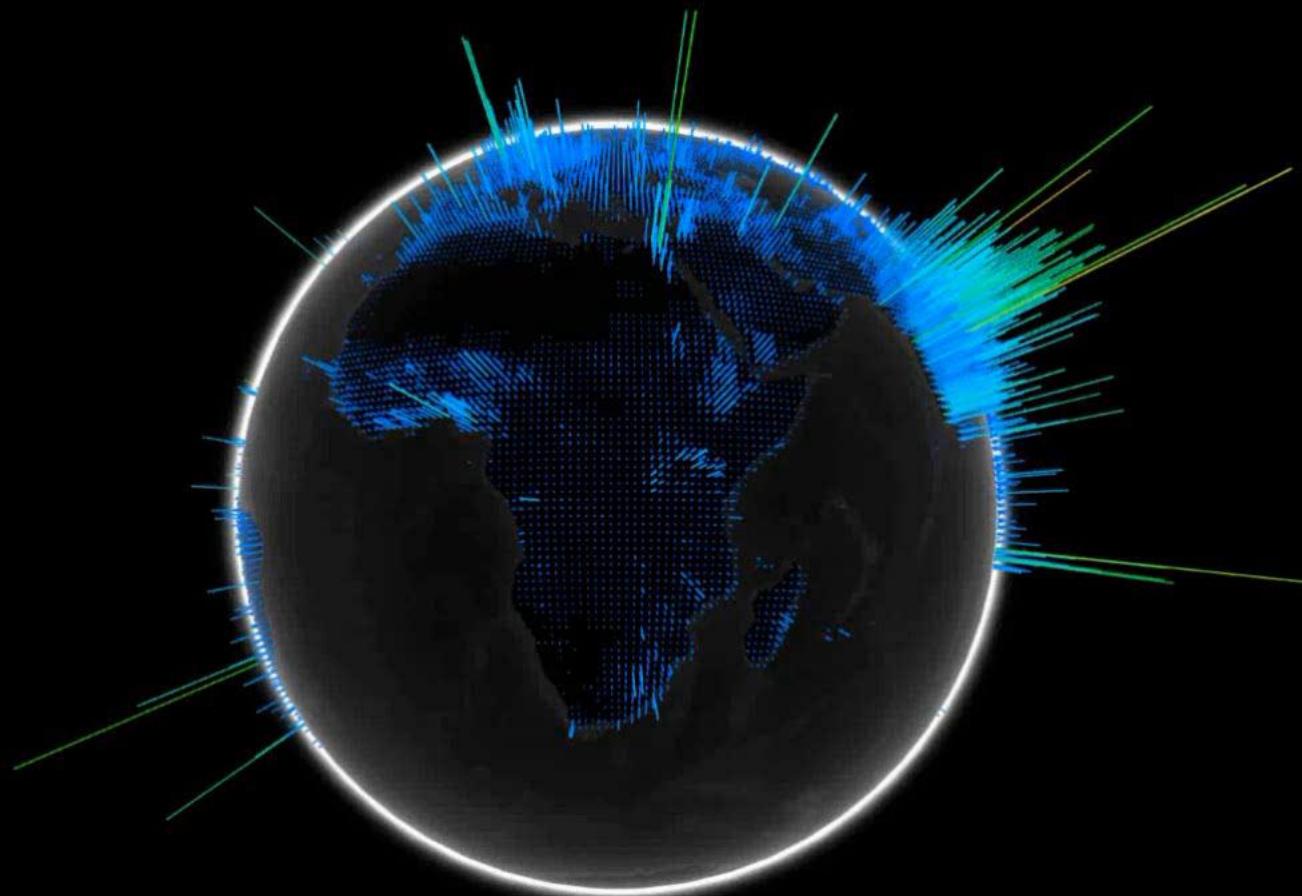
Редакторы



3dtin.com

Инфографика

World Population
1990 1995 2000



This is a
Chrome
Experiment

WebGL Globe · Created by the Google Data Arts Team · Data acquired from SEDAC

globe.chromeexperiments.com

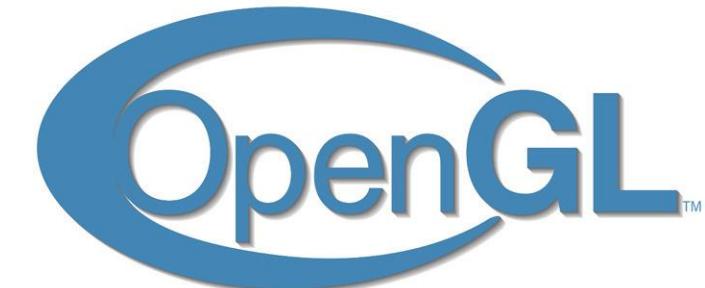
Технологии 3D



Microsoft®
Silverlight™



3D Technologies
R&D



03D



VRML⁹⁷

Преимущества



Преимущества



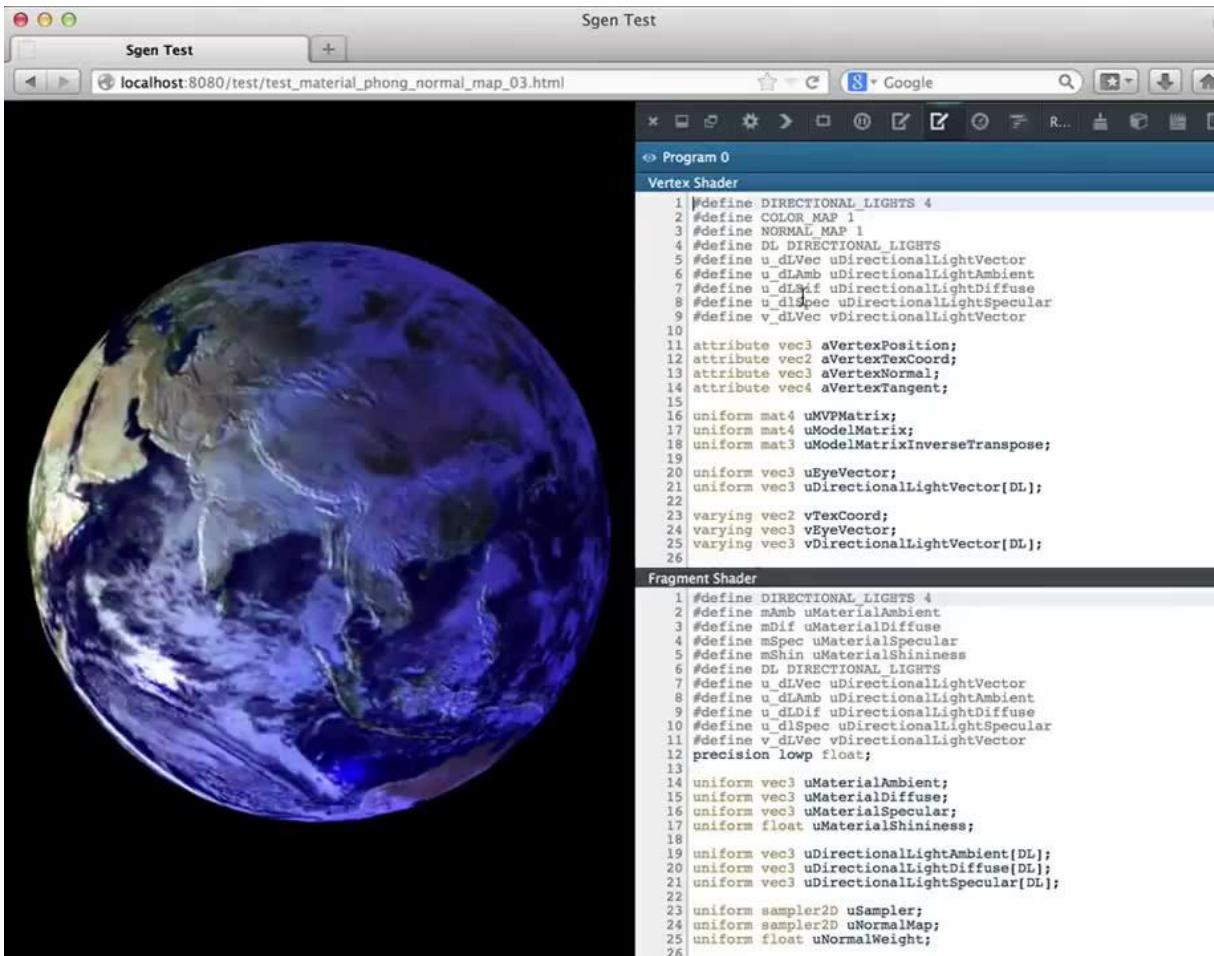
- Открытый стандарт
- Кроссплатформенность
- Высокая производительность



Преимущества



- Автоматическое управление памятью
- Отсутствие компиляции





HTML



JS



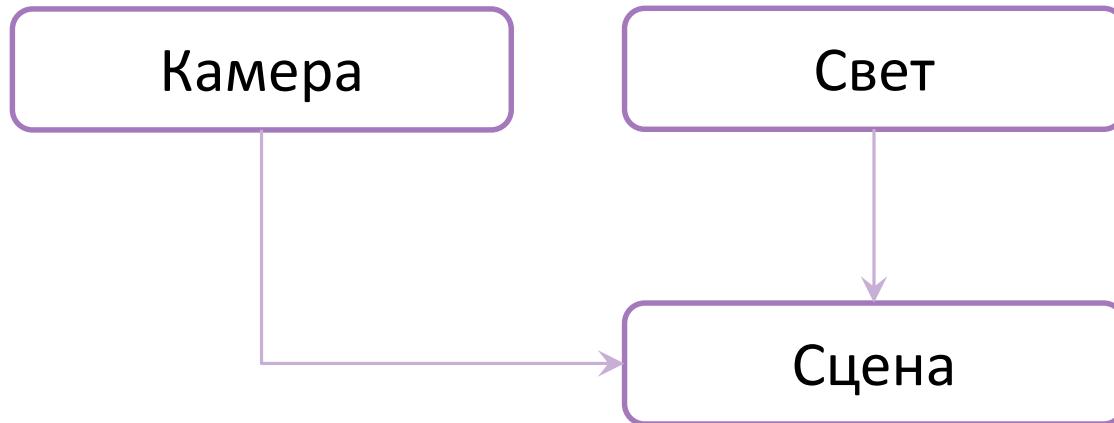
GLSL

Основные понятия

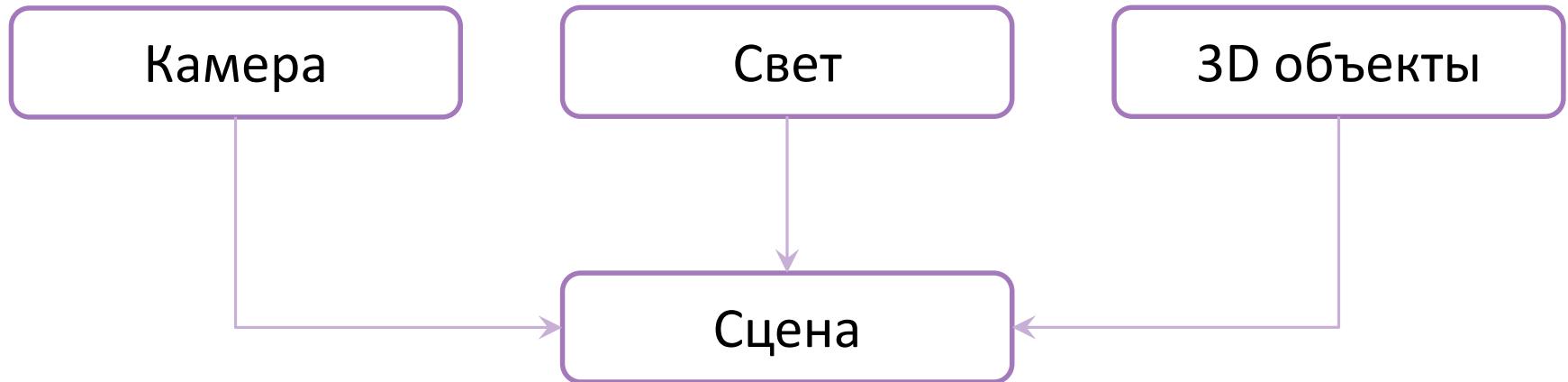
- Сцена
- Свет
- Камера



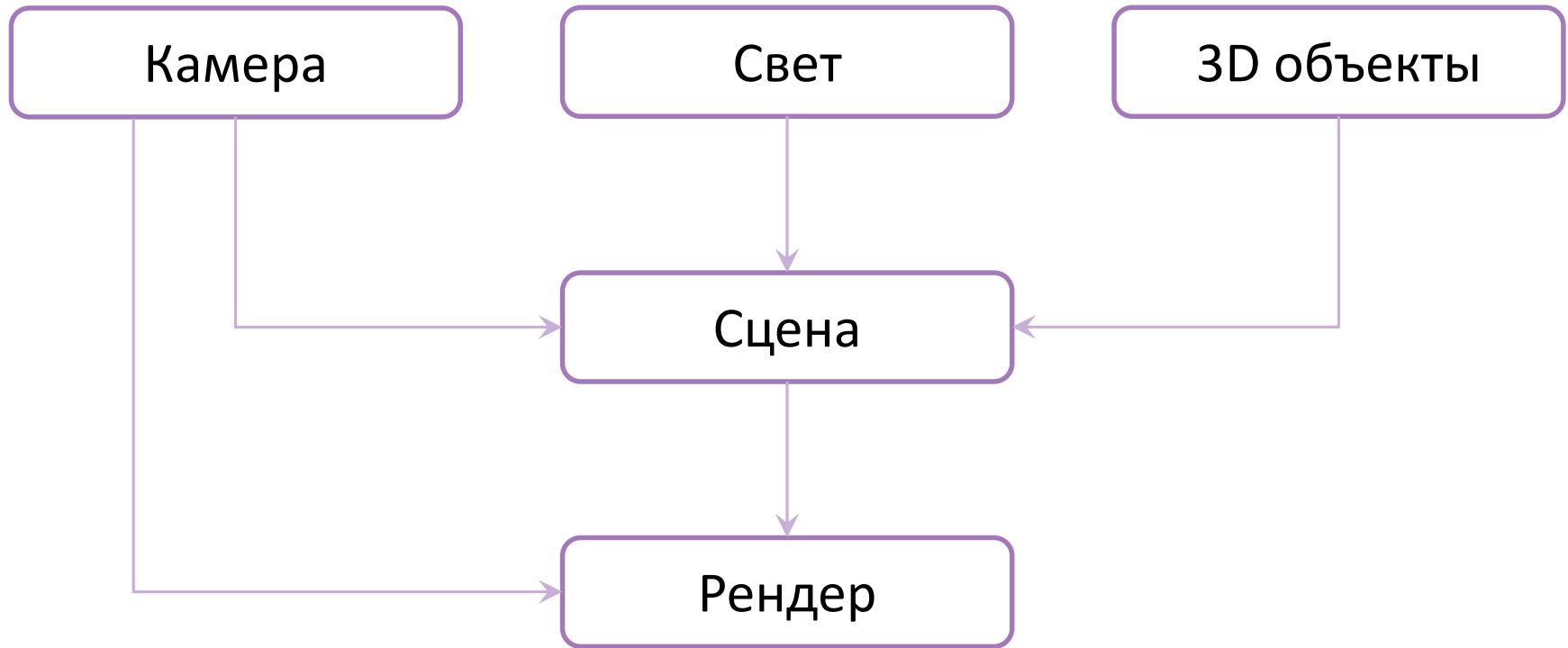
Взаимосвязь объектов



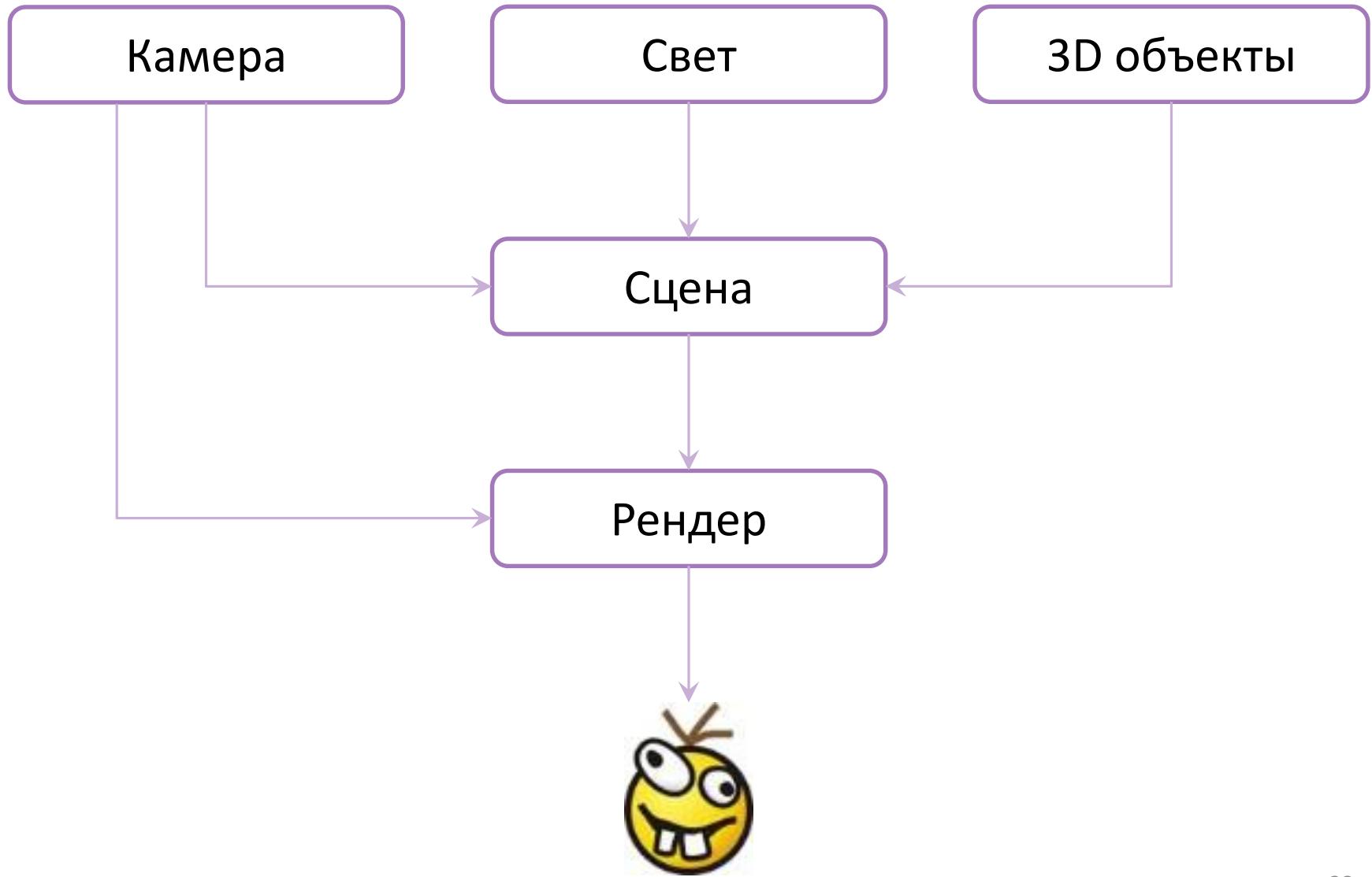
Взаимосвязь объектов



Взаимосвязь объектов

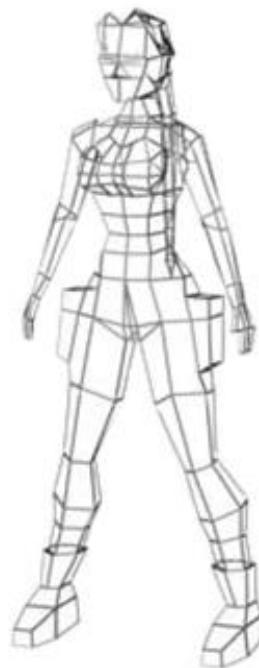


Взаимосвязь объектов

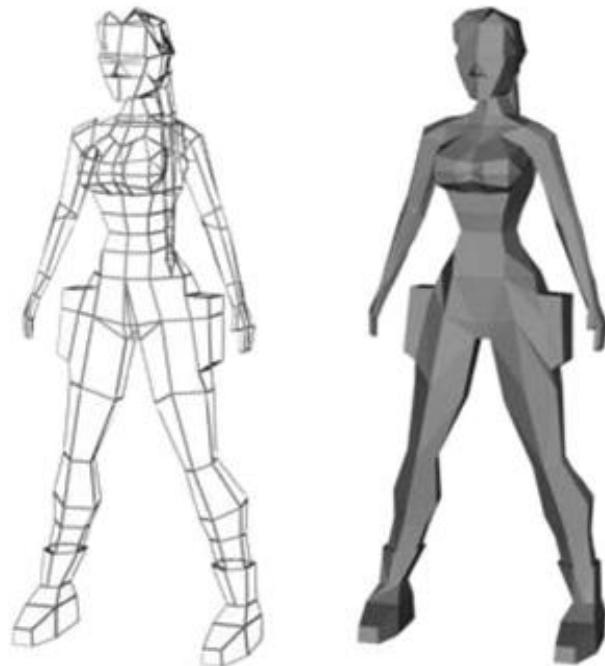
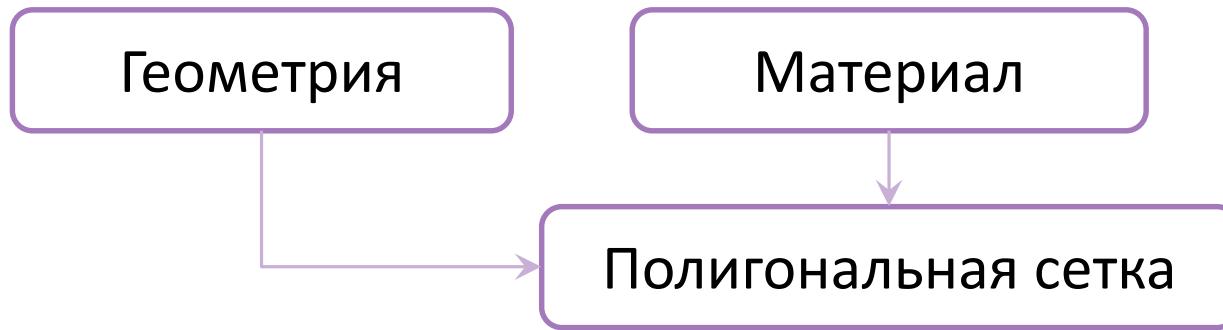


3D объект

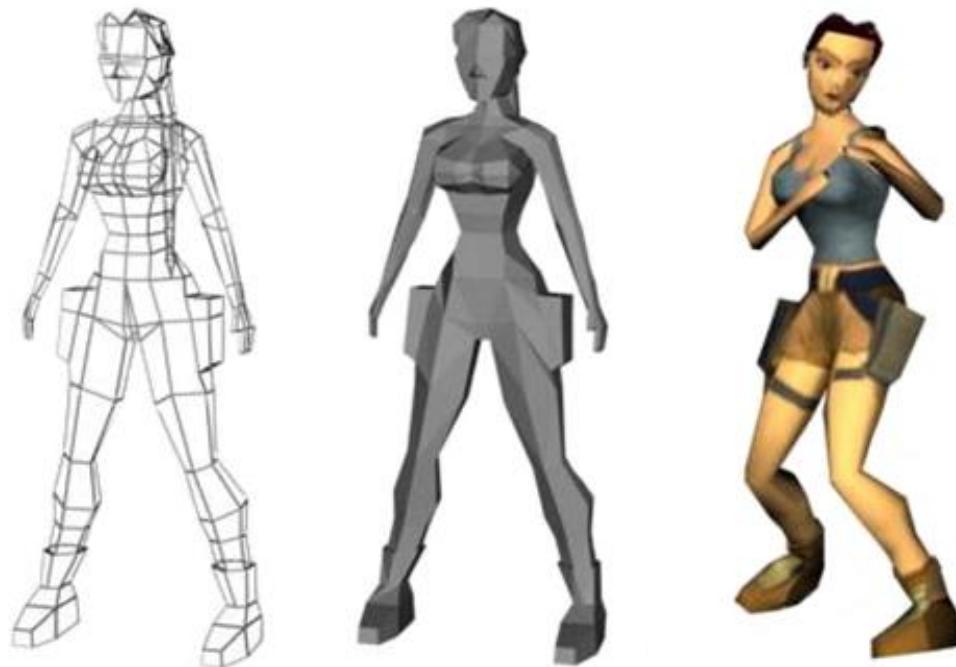
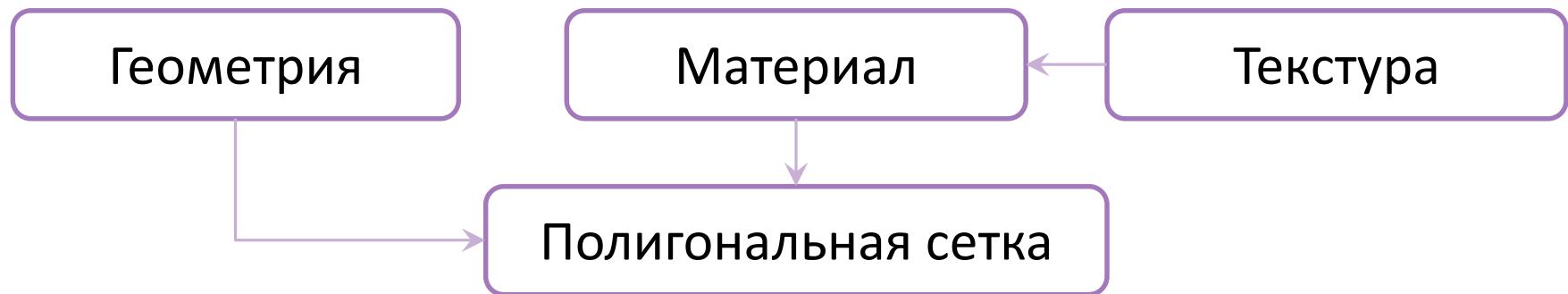
Геометрия



3D объект



3D объект



Визуализация

- Рендер
- Шейдер
- Анимация



Three.js

 Watch ▾

1,302

 Star

19,170

 Fork

5,645

- three.min.js 420 kb
- OBJLoader.js 8 kb
- TrackballControls.js 14 kb

@mrdoob

threejs.org

Входные данные

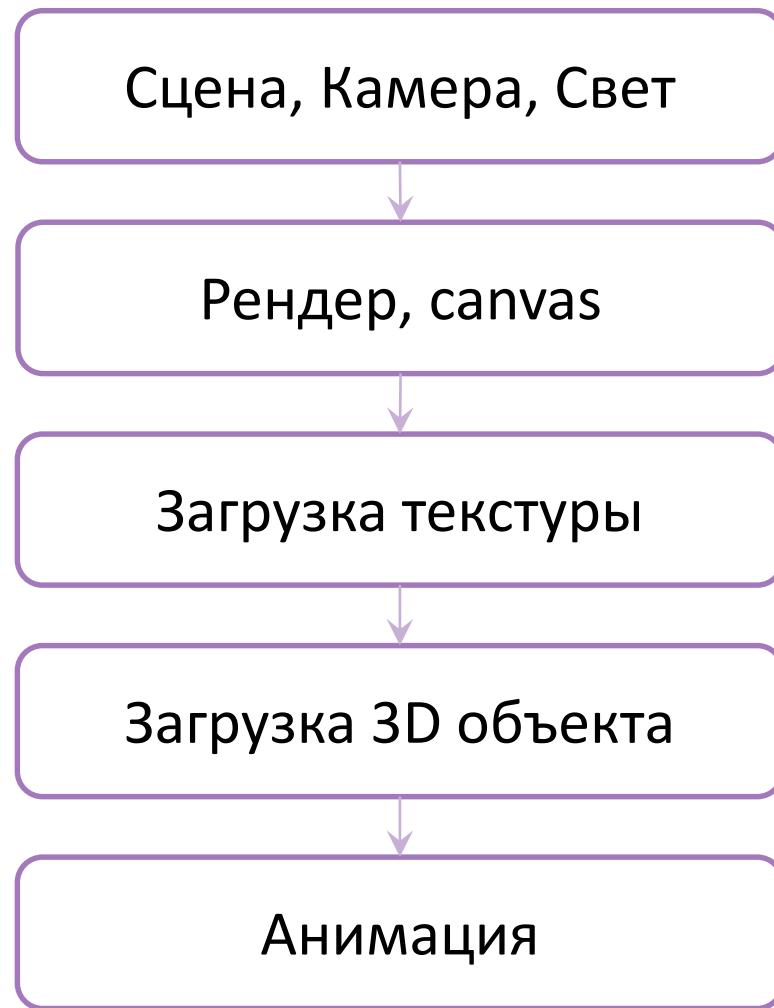
texture.jpg

object.obj



```
v 13.825026512145996 -96.140419006347656 3.6714630126953125
v 15.503727912902832 -96.428817749023438 2.1252975463867187
v 14.864977836608887 -95.269874572753906 1.5220794677734375
v 12.35379695892334 -91.997489929199219 1.42974853515625
v 13.748141288757324 -93.280204772949219 1.0182418823242187
v 7.9108209609985352 -85.125518798828125 3.9087066650390625
v 11.508156776428223 -94.102958679199219 4.5504951477050781
v 13.997708320617676 -95.774742126464844 2.4739608764648437
v 13.337004661560059 -94.254402160644531 1.780059814453125
v 10.512875556945801 -90.527717590332031 2.5589218139648438
v 9.9423093795776367 -91.974296569824219 4.4449958801269531
v 12.121970176696777 -93.814460754394531 2.7707862854003906
v 8.8889608383178711 -89.88848876953125 4.7834281921386719
v 8.5577688217163086 -87.575393676757813 3.7520294189453125
v 65.255134582519531 50.347309112548828 32.405288696289063
v 66.766136169433594 50.430992126464844 33.477485656738281
v 63.850997924804687 51.162227630615234 31.309993743896484
v 61.49749755859375 53.767066955566406 30.037763595581055
v 62.612274169921875 55.586418151855469 32.590259552001953
v 63.765449523925781 56.516639709472656 34.983329772949219
v 86.712333679199219 -29.699516296386719 67.651824951171875
v 86.298973083496094 -27.467063903808594 67.311981201171875
v 87.931144714355469 -26.754478454589844 69.544113159179688
v 87.254051208496094 -28.534954071044922 69.252769470214844
v 54.208457946777344 52.926681518554688 17.700454711914063
v 55.330917358398438 51.7030029296875 17.893693923950195
v 53.690010070800781 55.85009765625 21.359037399291992
v 82.511604309082031 -2.7372913360595703 12.380489349365234
v 83.751579284667969 -5.7412242889404297 13.007619857788086
v 83.226371765136719 -4.3318452835083008 12.781660079956055
v 82.699913024902344 -2.9909400939941406 12.637807846069336
v 81.90118408203125 -1.2090244293212891 12.495655059814453
v -22.076648712158203 72.794937133789063 6.7714595794677734
v -22.850921630859375 71.858016967773438 5.16961669921875
```

Алгоритм



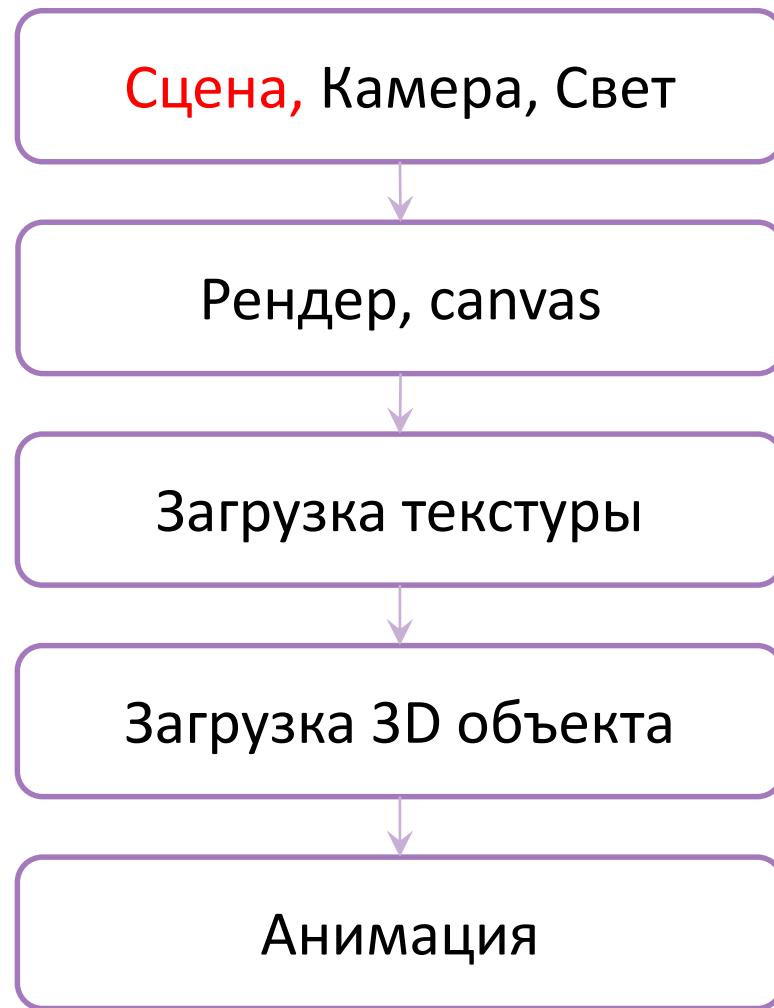
Сцена

```
Player.container = document.getElementById("webgl-player");
```

```
Player.size = {  
    width: Player.container.offsetWidth,  
    height: Player.container.offsetHeight  
};
```

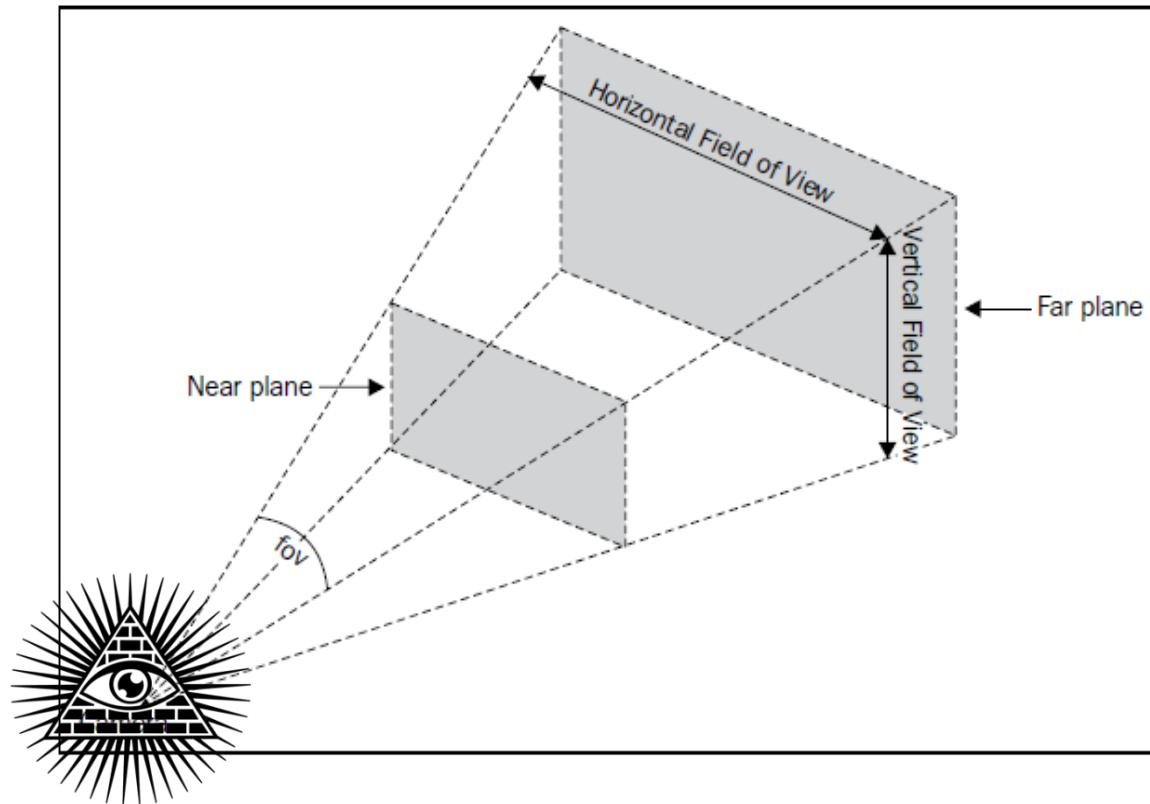
```
Player.scene = new THREE.Scene();
```

Алгоритм



Kamepa

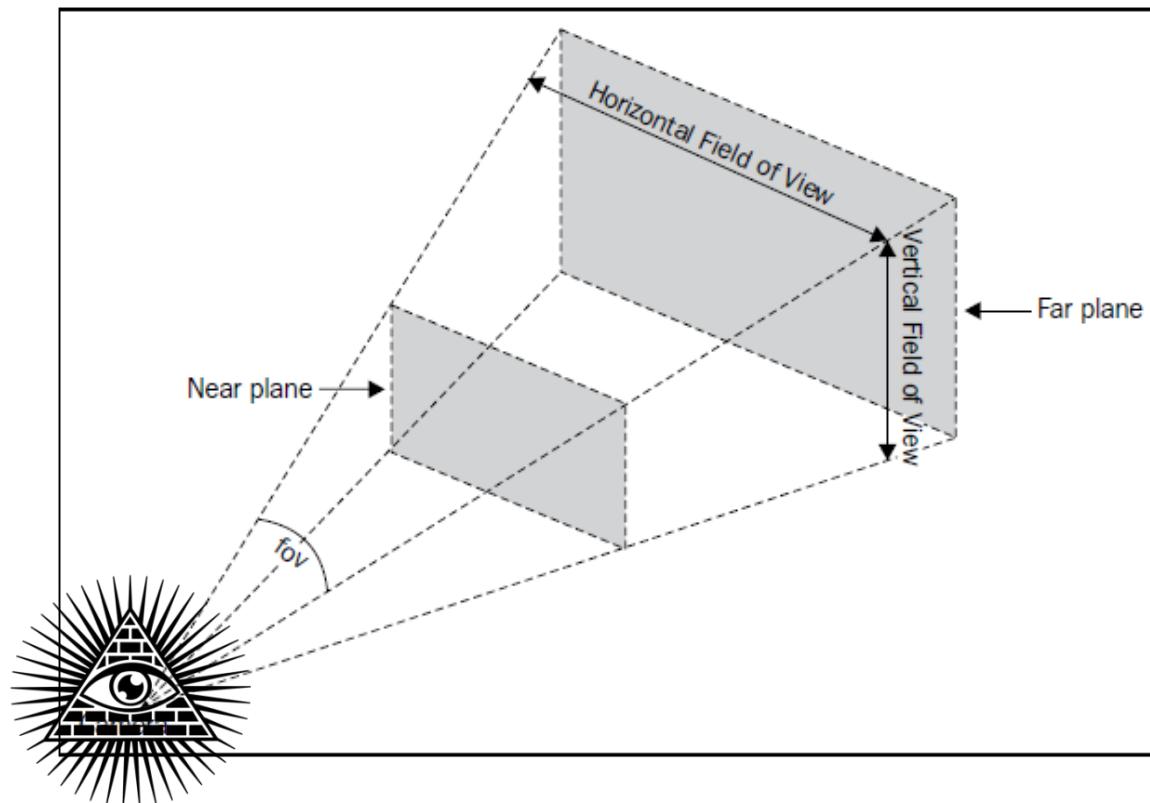
```
// PerspectiveCamera( fov, aspect, near, far )
aspect = Player.size.width / Player.size.height;
Player.camera = new THREE.PerspectiveCamera(45.0, aspect, 2, 8000);
```



Kamepa

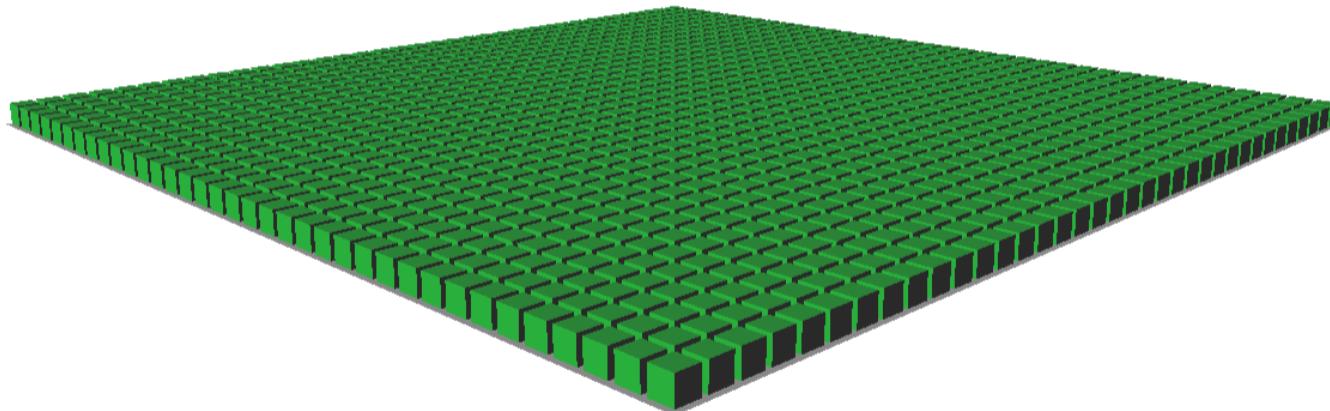
```
// PerspectiveCamera( fov, aspect, near, far )
aspect = Player.size.width / Player.size.height;
Player.camera = new THREE.PerspectiveCamera(45.0, aspect, 2, 8000);

Player.camera.position.z = 300;
Player.scene.add(Player.camera);
```

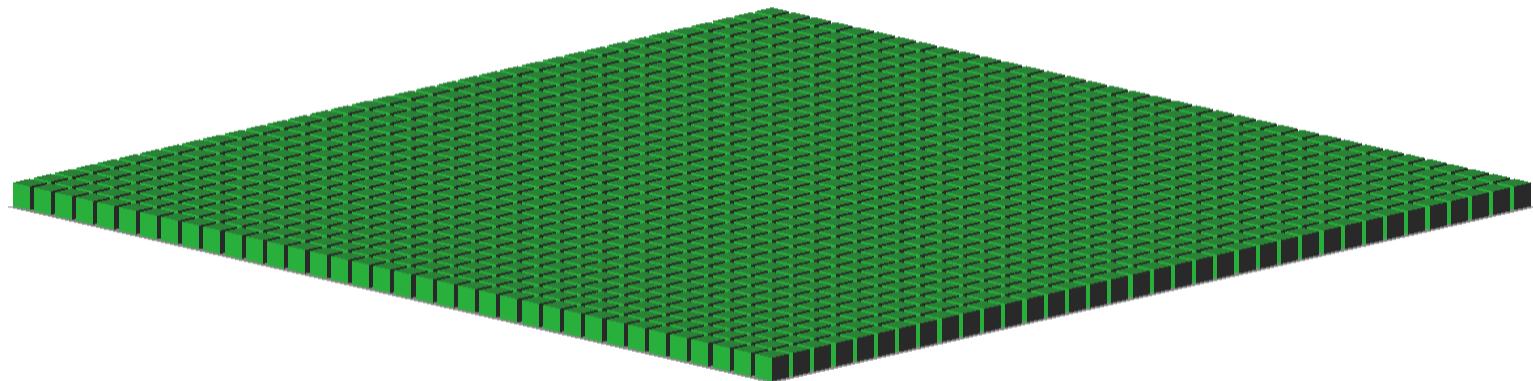


Типы камер

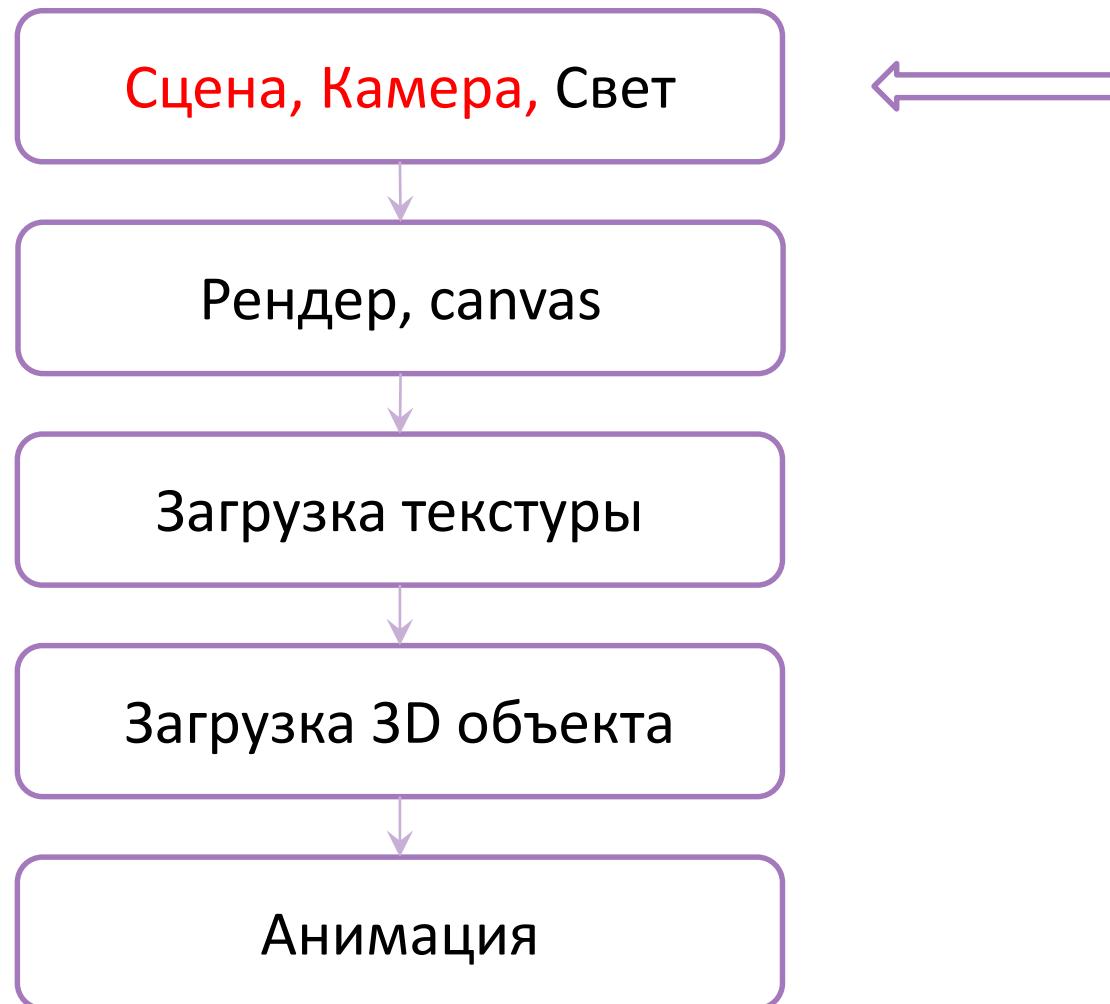
Перспективная проекция
PerspectiveCamera



Ортогональная проекция
OrthographicCamera



Алгоритм



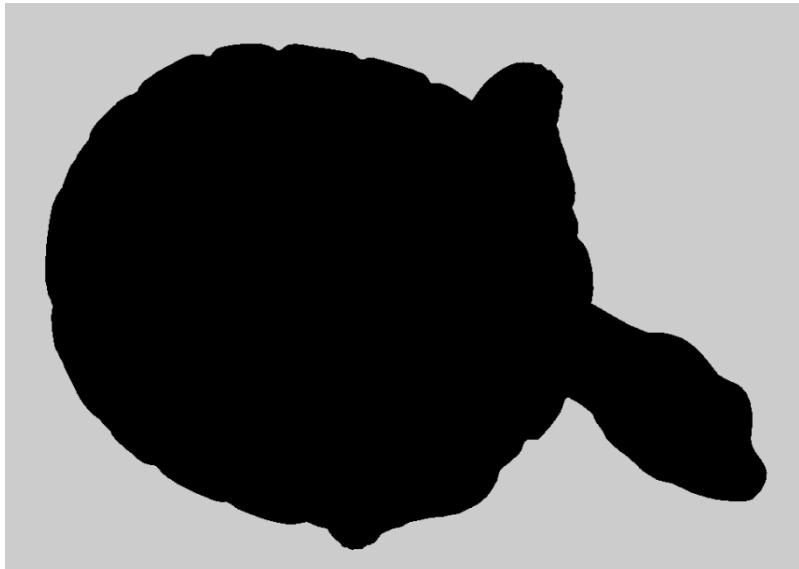
Свет, рендер, canvas

```
Player.light = new THREE.AmbientLight();  
Player.scene.add(Player.light);
```

```
Player.renderer = new THREE.WebGLRenderer({alpha: true});  
Player.renderer.setSize(Player.size.width, Player.size.height);
```

```
// canvas  
Player.container.appendChild(Player.renderer.domElement);
```

Свет



// Player.scene.add(Player.light)



Player.scene.add(Player.light)

WebGLRenderer

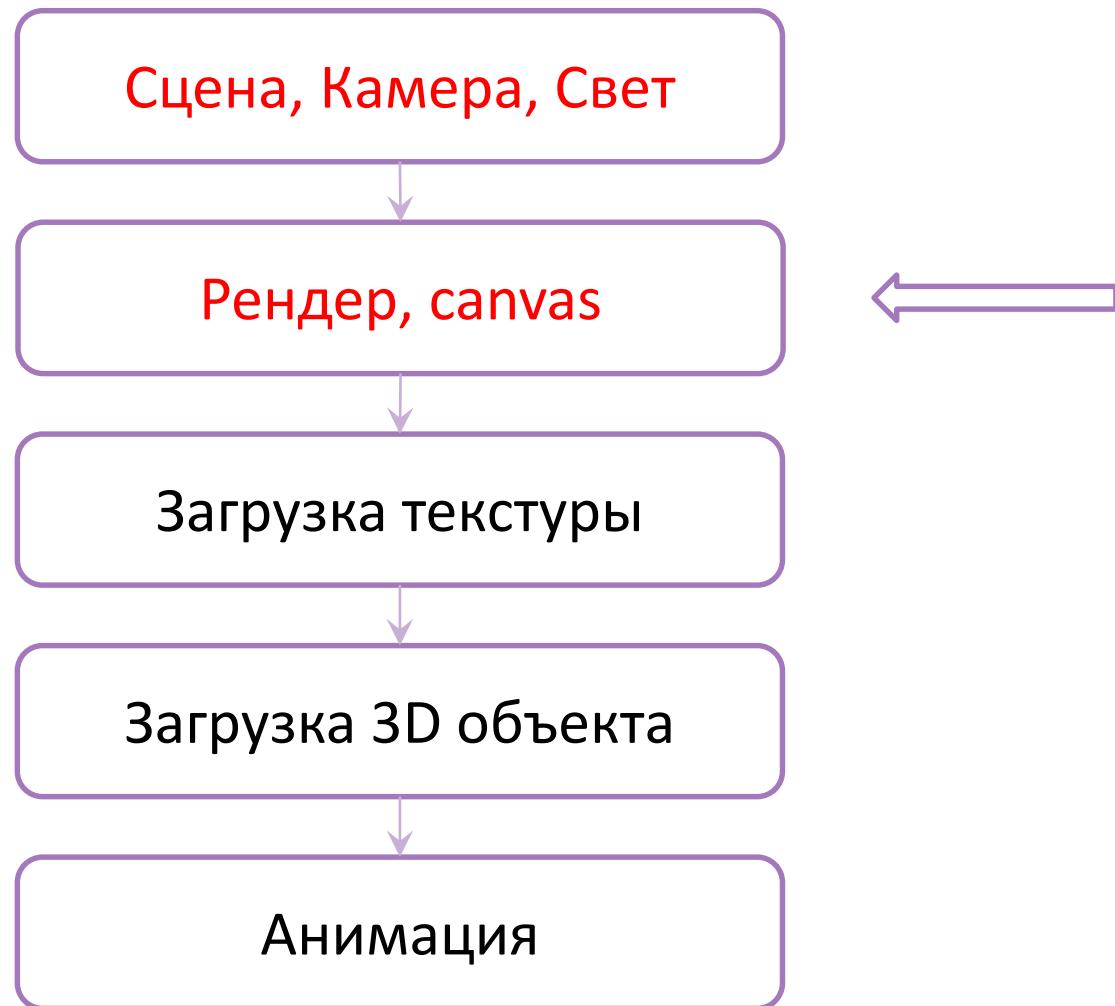


`THREE.WebGLRenderer()`



`THREE.WebGLRenderer({alpha: true})`

Алгоритм



Текстура

```
Player.textureLoader = new THREE.TextureLoader();
```

```
Player.textureLoader.load("texture.jpg", function(texture) {  
    Player.texture = texture;  
    Player.loadModel();  
});
```

Алгоритм



Загрузка 3D модели

```
loadModel: function() {  
    objectLoader = new THREE.OBJLoader();  
  
    objectLoader.load("object.obj", function(object) {  
        object.traverse(function(child) {  
            if (child instanceof THREE.Mesh) {  
                child.material.map = Player.texture;  
            }  
        });  
        Player.scene.add(object);  
    });  
}
```

Загрузка 3D модели

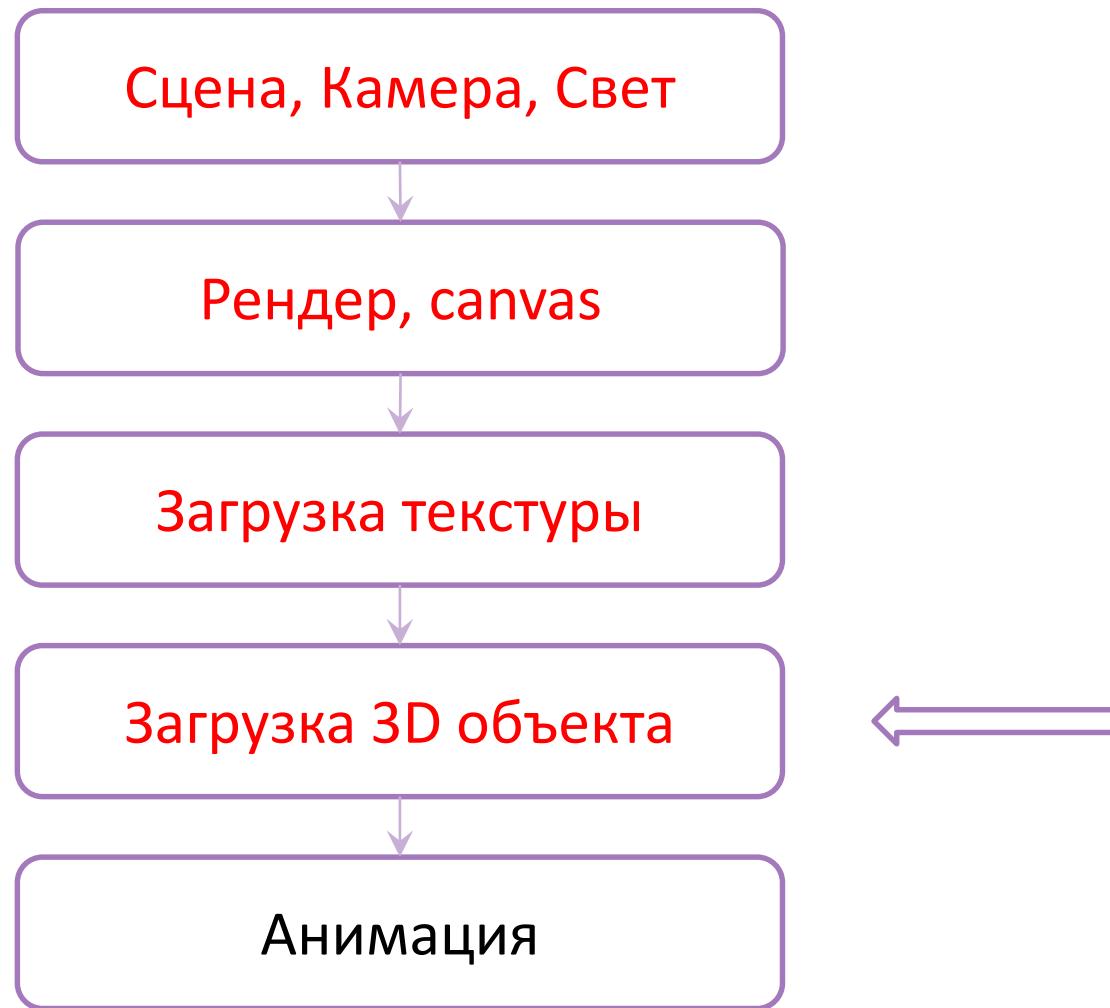
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        });  
        Player.scene.add(object);  
    });  
}
```

Загрузка 3D модели

```
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    objectLoader = new THREE.OBJLoader();  
  
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            }  
        });  
        Player.scene.add(object);  
    });  
}
```



Алгоритм



Анимация

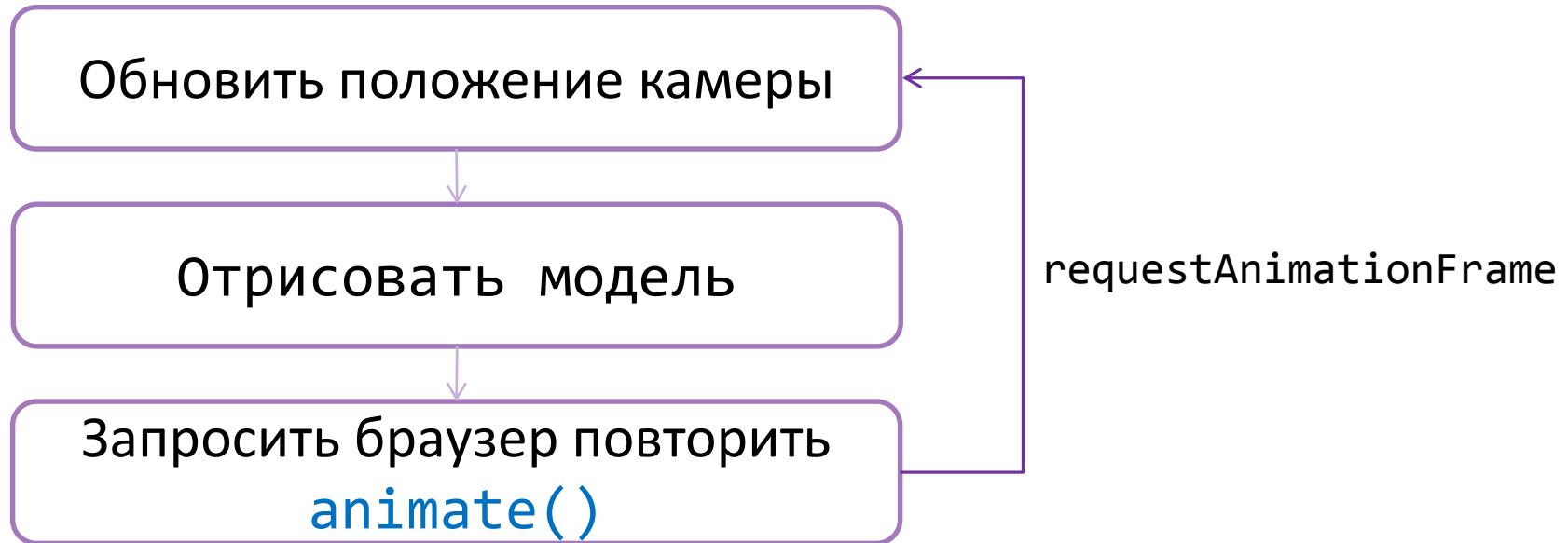
```
Player.animate();
```

```
animate: function() {  
    requestAnimationFrame(Player.animate);  
  
    Player.renderer.render(Player.scene, Player.camera);  
}
```

Анимация

```
Player.controls = new THREE.TrackballControls(Player.camera,  
                                         Player.container);  
  
Player.animate();  
  
animate: function() {  
    requestAnimationFrame(Player.animate);  
    Player.controls.update();  
    Player.renderer.render(Player.scene, Player.camera);  
}  
}
```

Анимация



```
animate: function() {  
    requestAnimationFrame(Player.animate);  
    Player.controls.update();  
    Player.renderer.render(Player.scene, Player.camera);  
}
```

viewshape.com

Feedback

The screenshot shows a 3D scan of a woman with shoulder-length brown hair and glasses, wearing a pink top. The scan is displayed against a black background. At the bottom of the main image, there are social sharing icons for Google+, Facebook, Link, and Embed html. To the right of the image, there is a summary of the scan's details:

- 34490 views
- Tags: Human Artec Eva Eva Big Bang Theory
- scanned with Artec Eva
- Total vertex: 133563
- Total triangles: 206902
- Texture resolution 512px*512px
- Texture size: 151 KB
- Download size: 5.56 MB

The license is listed as Attribution-NonCommercial-ShareAlike (CC BY-NC-SA). Below this, a section titled "You might also like" displays three other 3D models:

- A small model by ich4, which is a hand.
- A larger model of a "Fish and Bear Ceramic Vessel".
- A small model by Smooth Fusion1, which is a stylized human head profile.

At the bottom left, there are two comments:

- "So if we're "Sharing". Why can't we download??" by Ben
- "I would like the model like print, where is the download-button?"

WebGL библиотеки

- Three.js
- Babylon.js
- Turbulenz
- PhiloGL

three.js ^{r71}



Φ PhiloGL

Полезные ссылки

- ◆ davidscottlyons.com/threejs
- ◆ Книга [Learning Three.js: The JavaScript 3D Library for WebGL](#)
- ◆ Книга [WebGL. Программирование трехмерной графики](#)
- ◆ Никита Северинов diductio.ru/course/2060/

Исходники



github.com/Likita

Интерактивность Геймификация



Василика Климова



likita



vasilika.klimova



lik04ka

Спасибо за внимание!