```
var scene, camera, renderer, mesh;
var meshFloor, ambientLight, light;

var crate, crateTexture, crateNormalMap, crateBumpMap;

var keyboard = {};
var player = { height:1.8, speed:0.2, turnSpeed:Math.PI*0.02 };
var USE_WIREFRAME = false;

function init(){
        scene = new THREE.Scene();
        camera = new THREE.PerspectiveCamera(75, 1366/768, 0.1,
10000);

        mesh = new THREE.Mesh(
                new THREE.BoxGeometry(1,1,1),
                new THREE.MeshPhongMaterial({color:0xff4444,
wireframe:USE_WIREFRAME})
        );
        mesh.position.y += 1;
        mesh.receiveShadow = true;
        mesh.castShadow = true;
        scene.add(mesh);

        meshFloor = new THREE.Mesh(
                new THREE.PlaneGeometry(20,20, 10,10),
                new THREE.MeshPhongMaterial({color:0xffffff,
wireframe:USE_WIREFRAME})
        );
        meshFloor.rotation.x -= Math.PI / 2;
        meshFloor.receiveShadow = true;
        scene.add(meshFloor);

        ambientLight = new THREE.AmbientLight(0xffffff, 0.2);
        scene.add(ambientLight);

        light = new THREE.PointLight(0xffffff, 0.8, 18);
        light.position.set(-3,6,-3);
        light.castShadow = true;
        light.shadow.camera.near = 0.1;
        light.shadow.camera.far = 25;
        scene.add(light);


        var textureLoader = new THREE.TextureLoader();
        crateTexture =
textureLoader.load("crate0/crate0_diffuse.jpg");
        crateBumpMap = textureLoader.load("crate0/crate0_bump.jpg");
        crateNormalMap =
textureLoader.load("crate0/crate0_normal.jpg");

        crate = new THREE.Mesh(
                new THREE.BoxGeometry(3,3,3),
                new THREE.MeshPhongMaterial({
                        color:0xffffff,
                        map:crateTexture,
```

```
                        bumpMap:crateBumpMap,
                        normalMap:crateNormalMap
                })
        );
        scene.add(crate);
        crate.position.set(2.5, 3/2, 2.5);
        crate.receiveShadow = true;
        crate.castShadow = true;



        var geometry = new THREE.PlaneGeometry( 15, 20, 32 );
        var material=new THREE.MeshPhongMaterial({color:0xffffff,
side: THREE.DoubleSide})
         var plane = new THREE.Mesh( geometry, material );
                scene.add( plane );
                plane.position.set(-3,0,3);
                plane.receiveShadow = true;


        var geometry = new THREE.PlaneGeometry( 23, 20, 32 );
        var material=new THREE.MeshPhongMaterial({color:0xffffff,
side: THREE.DoubleSide})
         var plane = new THREE.Mesh( geometry, material );
                scene.add( plane );
                plane.position.set(8,4,1);
                plane.receiveShadow = true;
                plane.rotation.y = -Math.PI/2;

        var geometry = new THREE.PlaneGeometry( 23, 20, 32 );
        var material=new THREE.MeshPhongMaterial({color:0xffffff,
side: THREE.DoubleSide})
         var plane = new THREE.Mesh( geometry, material );
                scene.add( plane );
                plane.position.set(-7,4,1);
                plane.receiveShadow = true;
                plane.rotation.y = -Math.PI/2;



        // Model/material loading!
        var mtlLoader = new THREE.MTLLoader();
        mtlLoader.load("models/male112.mtl", function(materials){

                materials.preload();
                var objLoader = new THREE.OBJLoader();
                objLoader.setMaterials(materials);

                objLoader.load("models/male112.obj", function(mesh){

                        mesh.traverse(function(node){
                                if( node instanceof THREE.Mesh ){
                                        node.castShadow = true;
                                        node.receiveShadow = true;
                                        node.position.set(-3,0,-3);
                                }
```

```
                        });

                        scene.add(mesh);
                        mesh.position.set(-4, 0, 5);
                        mesh.rotation.y = -Math.PI/4;
                });

        });


        camera.position.set(0, player.height, -5);
        camera.lookAt(new THREE.Vector3(0,player.height,0));

        renderer = new THREE.WebGLRenderer();
        renderer.setSize(1280, 720);

        renderer.shadowMap.enabled = true;
        renderer.shadowMap.type = THREE.BasicShadowMap;

        document.body.appendChild(renderer.domElement);

        animate();
}

function animate(){
        requestAnimationFrame(animate);

        mesh.rotation.x += 0.01;
        mesh.rotation.y += 0.02;
        crate.rotation.y += 0.06;


        if(keyboard[87]){ // W key
                camera.position.x -= Math.sin(camera.rotation.y) *
player.speed;
                camera.position.z -= -Math.cos(camera.rotation.y) *
player.speed;
        }
        if(keyboard[83]){ // S key
                camera.position.x += Math.sin(camera.rotation.y) *
player.speed;
                camera.position.z += -Math.cos(camera.rotation.y) *
player.speed;
        }
        if(keyboard[65]){ // A key
                camera.position.x += Math.sin(camera.rotation.y +
Math.PI/2) * player.speed;
                camera.position.z += -Math.cos(camera.rotation.y +
Math.PI/2) * player.speed;
        }
        if(keyboard[68]){ // D key
                camera.position.x += Math.sin(camera.rotation.y -
Math.PI/2) * player.speed;
                camera.position.z += -Math.cos(camera.rotation.y -
Math.PI/2) * player.speed;
        }
```

```
        if(keyboard[37]){ // left arrow key
                camera.rotation.y -= player.turnSpeed;
        }
        if(keyboard[39]){ // right arrow key
                camera.rotation.y += player.turnSpeed;
        }

        renderer.render(scene, camera);
}

function keyDown(event){
        keyboard[event.keyCode] = true;
}

function keyUp(event){
        keyboard[event.keyCode] = false;
}

window.addEventListener('keydown', keyDown);
window.addEventListener('keyup', keyUp);

window.onload = init;
```