

Drawing Solar System

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1 Introduction

This is a JavaScript program drawing solar system of with WebGL. In this program, eight planets as well as their satellites and the asteroid belts are displayed on the canvas. Users can use the mouse and the keyboard to control the direction of viewing.

2 Implementation

First, draw the planets. The planets are spheres around the sun. The method of drawing a sphere is similar to that of drawing a circle. A sphere is composed of many triangles. Two spherical angles are used to do the iteration, and the rectangular coordinates can be get by the spherical coordinates.

Second, draw the satellites. A satellite is rotating around a planet. The method to get the orbit is to rotate the prime meridian around the Y axis, then rotate it around the Z axis. The rotation angles and the heights are iterated by the number of the satellites of the planet.

Third, draw the asteroid belts. The asteroid belts are many small planets, whose distances to the sun are between that of Mars and Jupiter. The sizes of the asteroids are similar to the satellites. In order to get the asteroids, random numbers between 0 and 1 are used to get the coordinates.

fourth, let the stars move. To planets are rotating around the sun, and the satellites are rotating around their planets. To realize the effect of rotation, the coordinates of the stars are multiplied by the rotation matrixes.

Last, interact with users. By pressing the keyboards, the camera is translated. By pressing the mouse, the camera is rotated. To realize the effect, just multiply the coordinates of all pixels by three matrixes, one for translation, another for rotation by X axis, and the other for rotation by Y axis.

3 Result

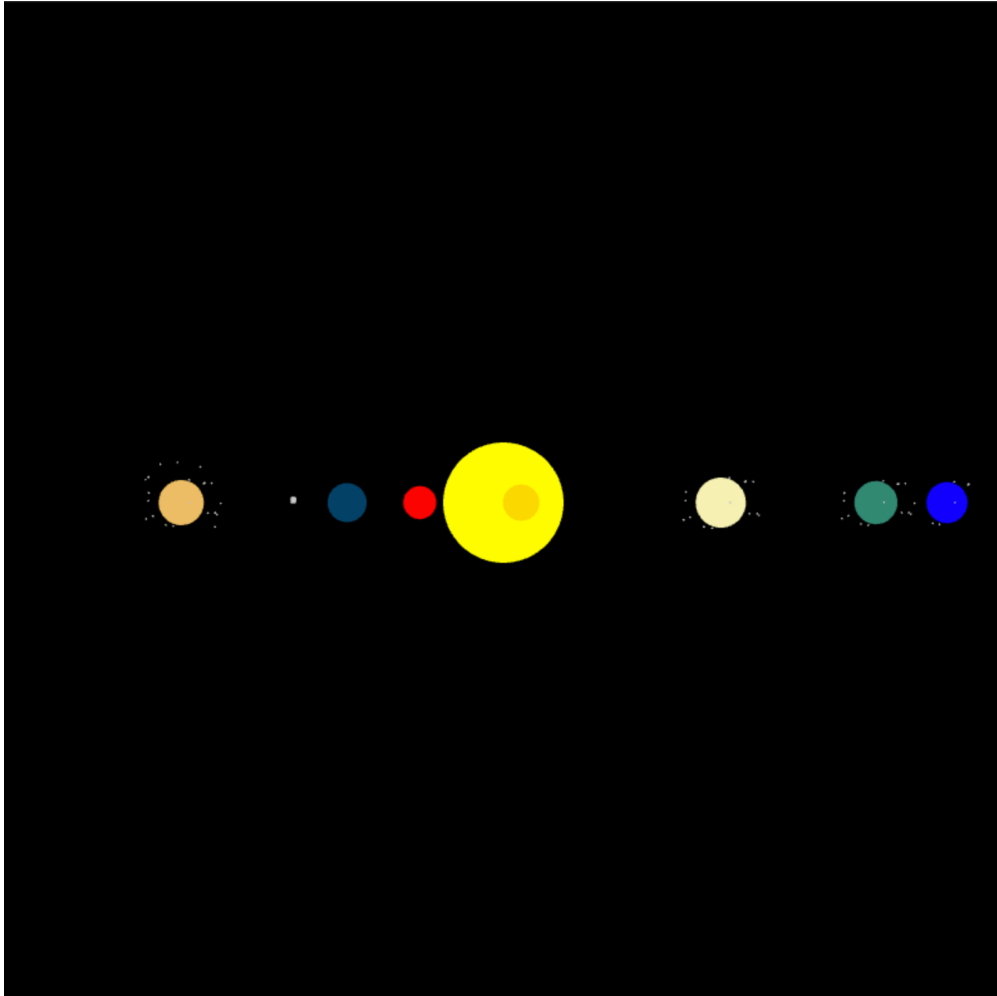


Figure 1: camera not moved

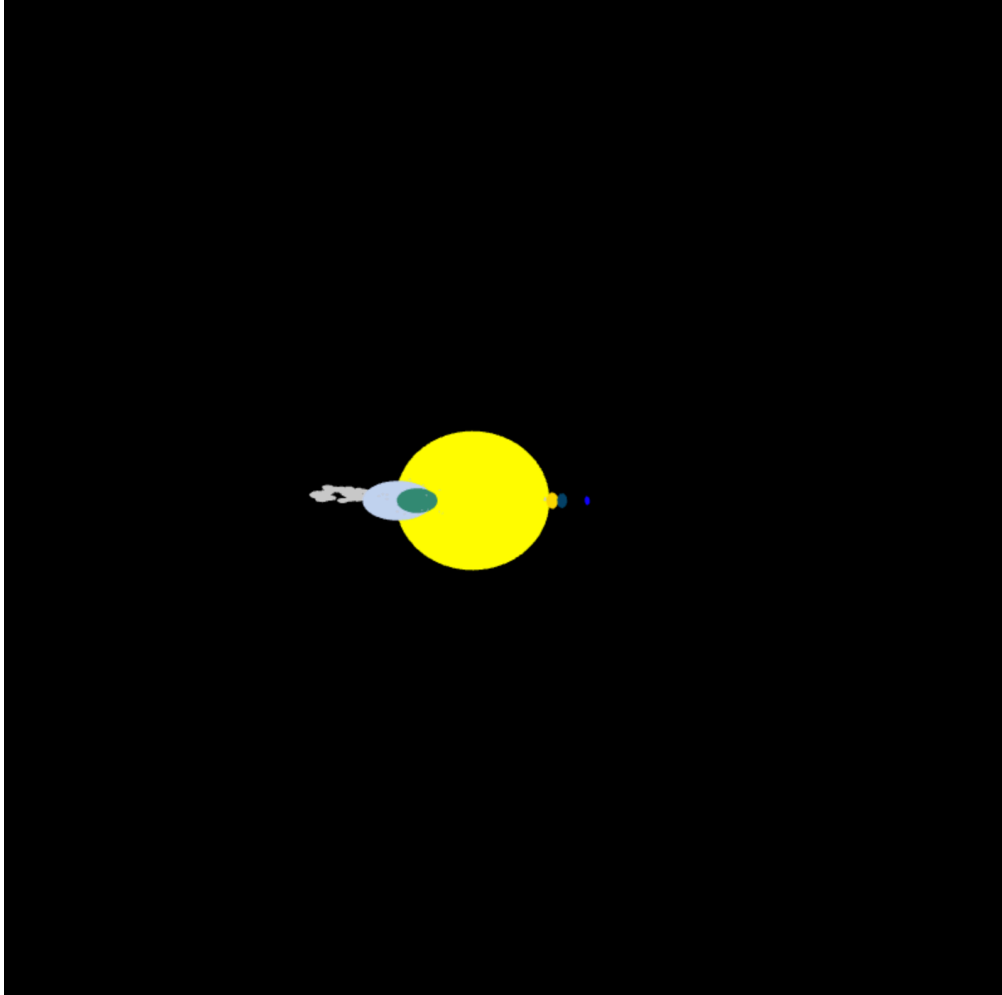


Figure 2: camera after translation

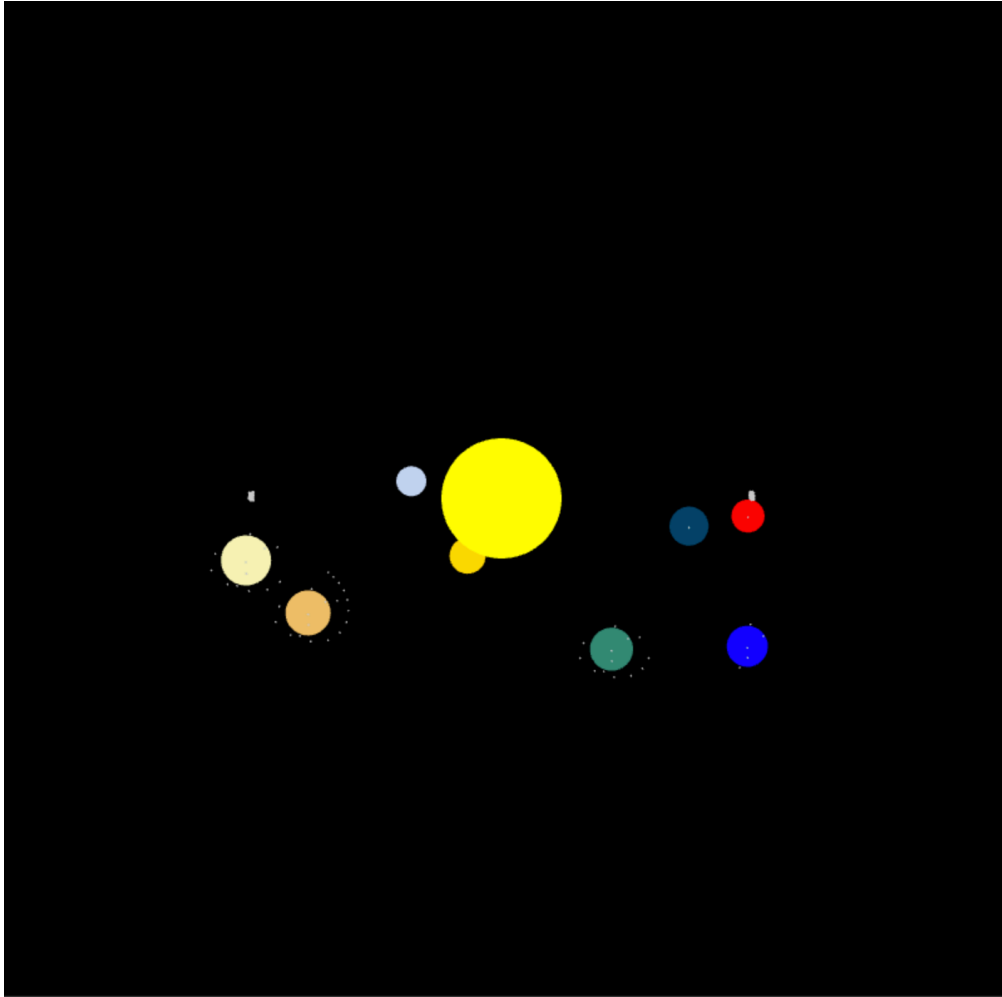


Figure 3: camera after rotation