

## 1. Objective

- 1) Making rotating spheres like Solar System

## 2. Data Structure & Algorithm

- 1) I made instancing my own spheres that form Sun and other planets in sphere.h, which is the extension of previous assignment.
- 2) Spheres have own attributes, which are type (is star or planet), position, rotation speed, etc.
- 3) If type is planet, in update phase should multiply one more rotation matrix after multiplying translate matrix, that is revolution.

## 3. Making Camera view

- 1) For this, I extended trackball.h, and reuse the mouse tracking values for the specifying moving difference.
  - i. Panning – *p\_update()*
    - a. It can be accomplished by modifying u-axis, v-axis in the view matrix of camera space.
    - b. For that, I multiplied the inverse look\_at-matrix which has original eye, at, up to original view matrix
      - A. It made camera view to model view
    - c. Then multiplied the new look\_at-matrix which has updated values, which are eye position and at position, by moving difference of mouse motion.
  - ii. Zooming – *z\_update()*
    - a. It can be accomplished by modifying n-axis in the view matrix of camera space.
    - b. I just multiplied the translate-matrix, which moves following n-axis, to original view matrix

## 4. Advanced feature - texturing

- 1) In directory /bin/images there is the collection of images that are textures of planets and Sun.
- 2) By referencing the texture example, I easily added textures to models.
- 3) Texture is applied with phong-shading model only except Sun.

## 5. Discussion

- 1) I thought moving eye is better idea, because it is easy for tracking eye position and eye position value can be reused for any other situation. But it didn't work smoothly
- 2) It worked more roughly, when I compared with the original methods. Although I consider (not deeply), I cannot infer the reason why it sees like that.