Computer Graphics

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Viewing in Three.js

- `THREE.PerspectiveCamera` implements a pinhole camera model
  - Use for 3D scenes
- `THREE.OrthographicCamera` implements a distance preserving mapping to 2D
  - suitable for 2D rendering
  - 3D scenes in special cases, e.g., CAD
  - In scenes distant from the camera with little relative depth (Real world: camera with a long zoom lens pointed at a far away object).

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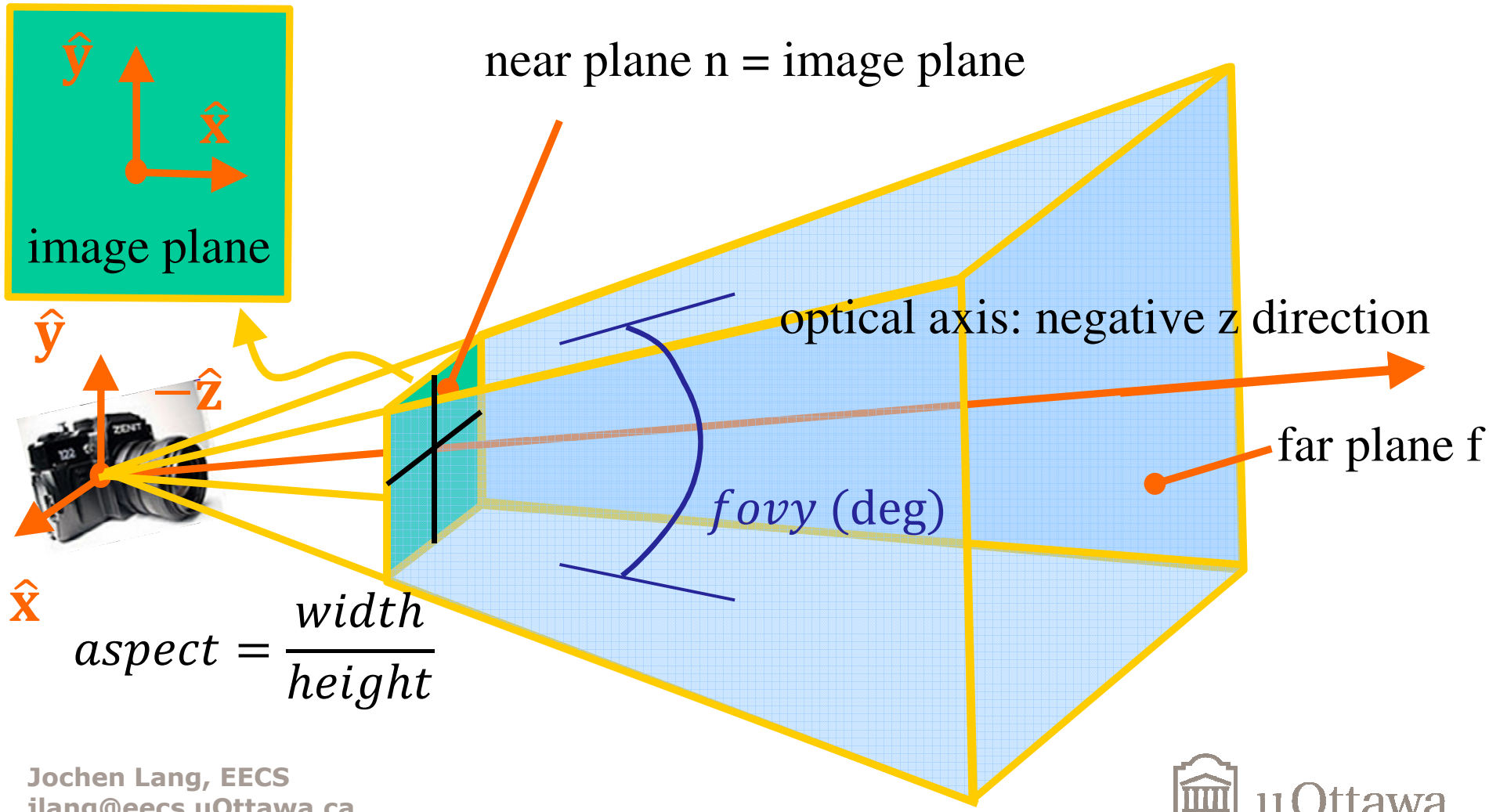
Perspective Projection

```
THREE.PerspectiveCamera( fovy, aspect, |n|, |f| )
```



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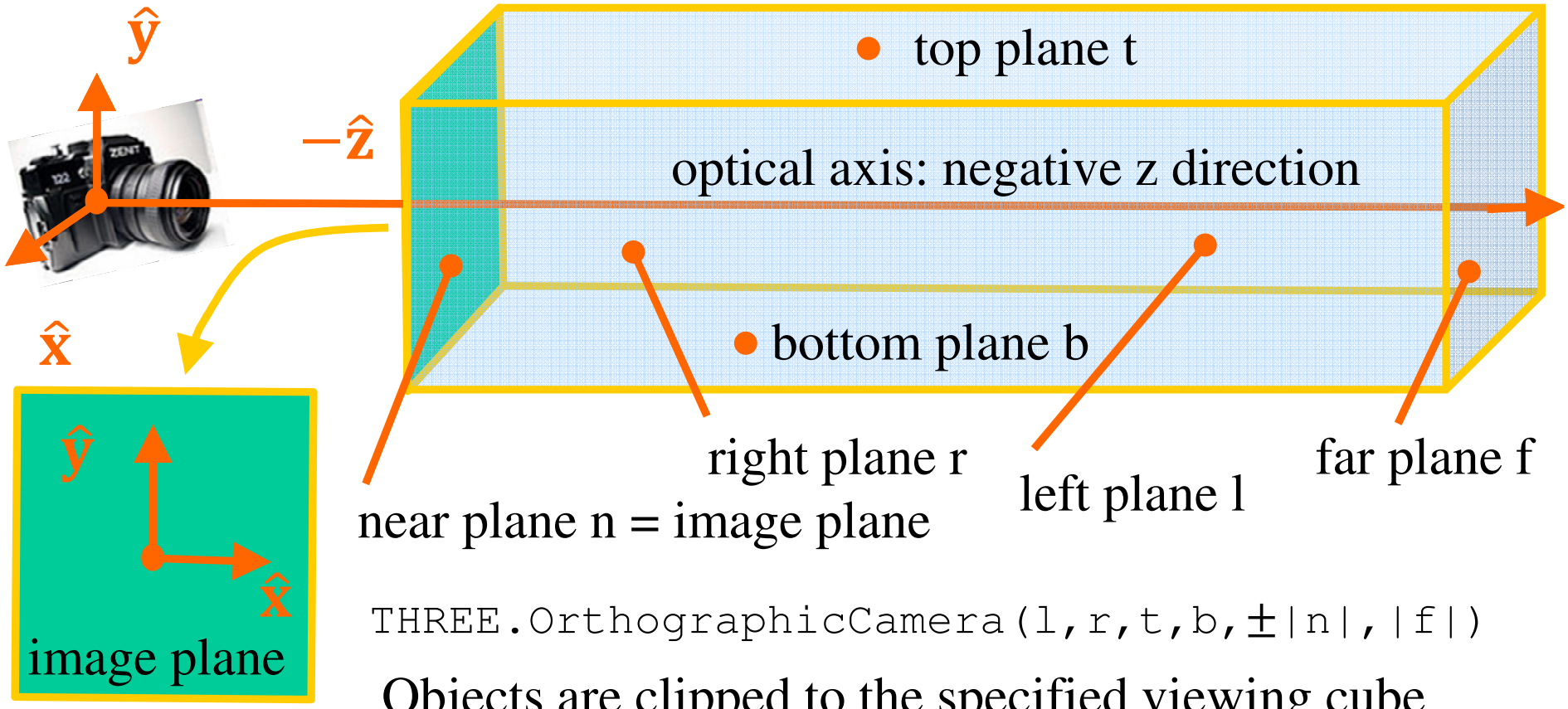
Orthographic Projection



`THREE.OrthographicCamera(l,r,t,b,±|n|,|f|)`

Objects are clipped to the specified viewing cube

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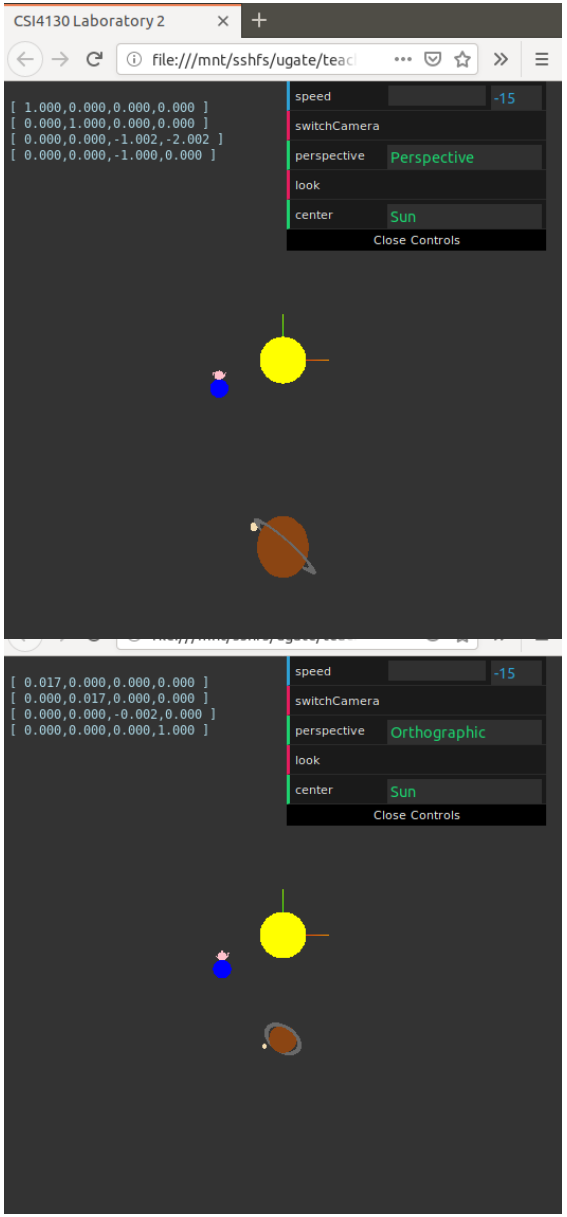
First Task in this Lab

- Run the starter code
  - Modified solar system solution with additional controls
- Modify the starter code to let the user switch cameras
  - Once the switching set the parameters such that the size of the sun stays the same when the camera is orthographic or perspective



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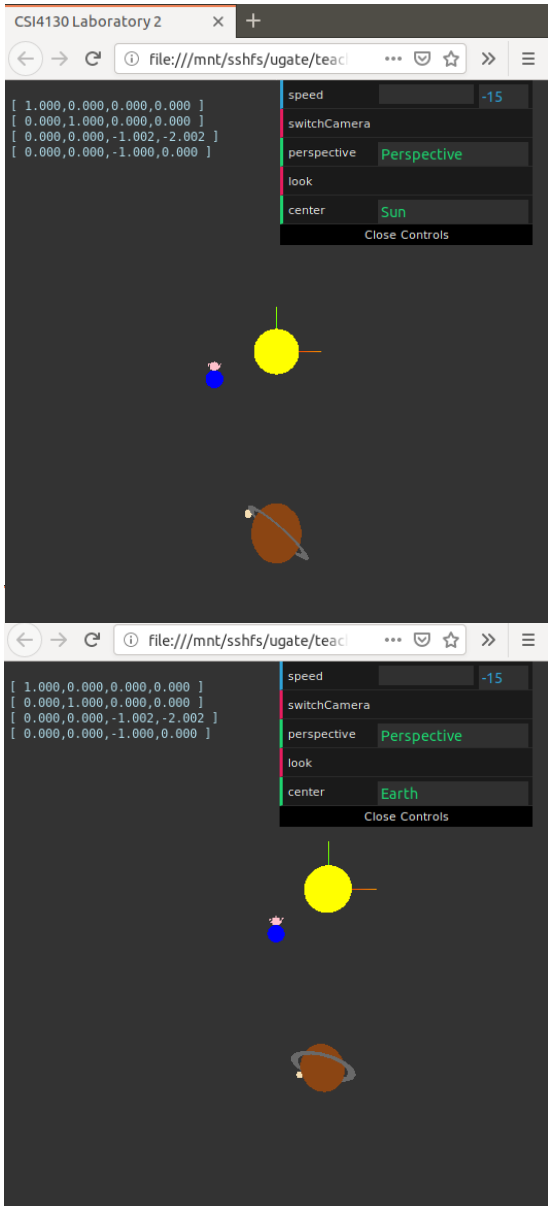
Placing and Directing the Camera with lookAt

- The solar system is setup such that the camera looks at the sun with world coordinates $\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$
- In general we have three calls to achieve lookAt

```
camera.position.set(eye.x,eye.y,eye.z);
camera.up = new THREE.Vector3(up.x,up.y,up.z);
camera.lookAt(center);
```

Second Task in Lab

- Let the user switch between looking at the sun and earth.
  - Controls are already coded but need to find position of earth
  - But the earth is moving, i.e., lookat needs to be updated before every new frame



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Summary

- Camera setup includes
  - Setting the type of projection with the corresponding parameters
  - Placing and orienting the camera (a rigid body transform)

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