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Project B: Human hand and camera control

User's Guide:

My goal for this project is: on the basis of project A, import camera and view control, light diffuse, viewports and some other interesting feature.

Most features of Project A have been kept:

Press H/ F1 on the keyboard or click the Help button blow the canvas will go to the help message.
The hand opens and closes at the same time its shape and color change automatically over time.
You can use mouse drag to rotate the hand to any angle, and use ASDF buttons on the keyboard to move it around the canvas.
The paper plane rotates swings left and right at the same time it rotates with the string.
You can the Faster and Slower buttons blow canvas to accelerate or slow down the speed of movement. The current rotating speed shows a little above these buttons, the larger value is the faster the objects moves.

New features:

Press Arrows buttons and B(raise) and N(lower) to move the view to any place in the 3D space.

Press Z(up), X(down), C(left), V(right) to turn the camera up down left and right. Just like raise lower or turn left and right the head.

Mouse drag for Rotating the Hand with Quaternion. Now the hand's rotate is using the Quaternion which is more smoothly and authentic.

Click Flying-airplane button to enter airplane navigation control. In this method, use J(left), L(right), I(up), K(down) to drive even roll pitch or yaw the camera just like flying an airplane.

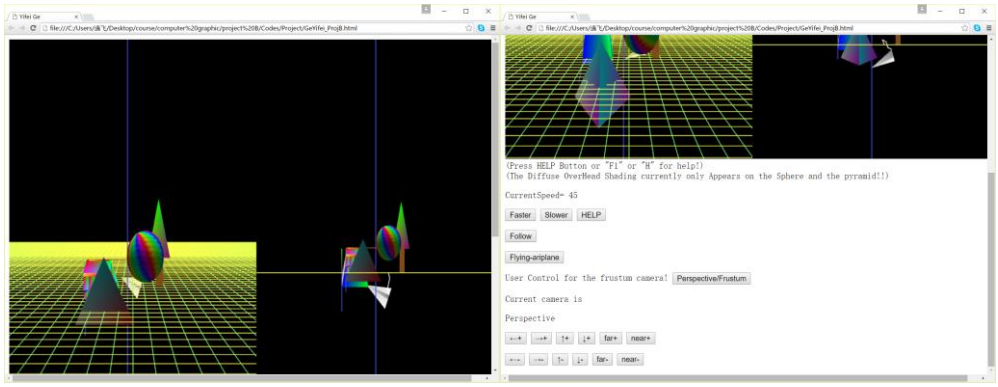
Click the Follow button to switch the perspective camera to the little finger of the hand.

Click Perspective/Frustum button to switch the perspective view between perspective and frustum. In frustum, you can use the 12 buttons blow to freely adjust the camera.

Results:

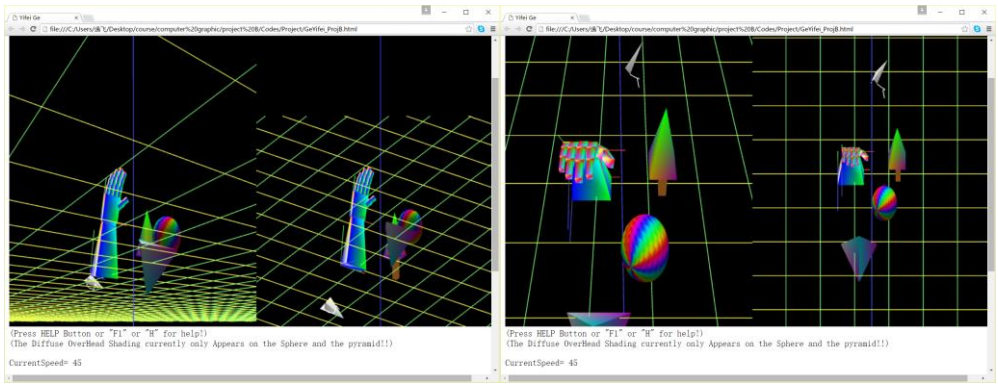
Follows are the results:

Basic layout:



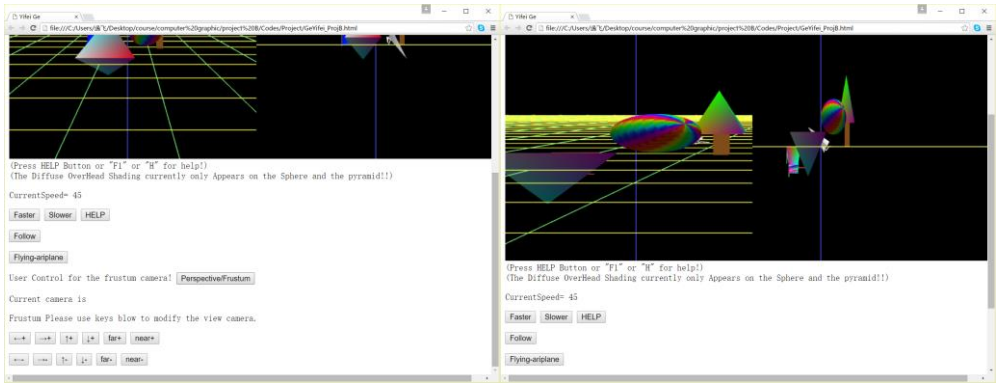
This is the basic layout and the control buttons. It is clearly that there are two side-by-side view ports and the left one is perspective (or frustum) the right one is orthographic two viewports share the same look at point. The perspective one has 40-degee field-of-view and the orthographic fits the requirement of object distance. When window is resized, the canvas will atomically fill the window and has no distort. There is the ground plane grid and Z axes to the sky. There is also tow 3D axes on the arm and paw of the hand. The hand has a lot more joints and vertices than the requirement. And there also four additional multi-color 3D shapes (tree, paper plane, ball and pyramid). There is light diffuse from top on the pyramid and the ball, and no diffuse on other objects.

3D View Control:



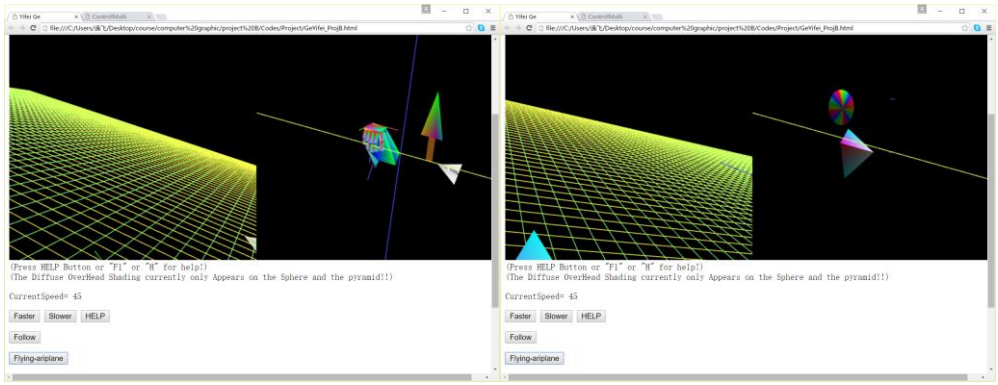
Using Arrow buttons and ZXCVBN can easily move the view to any place in 3d space.

User Adjustable asymmetric camera:



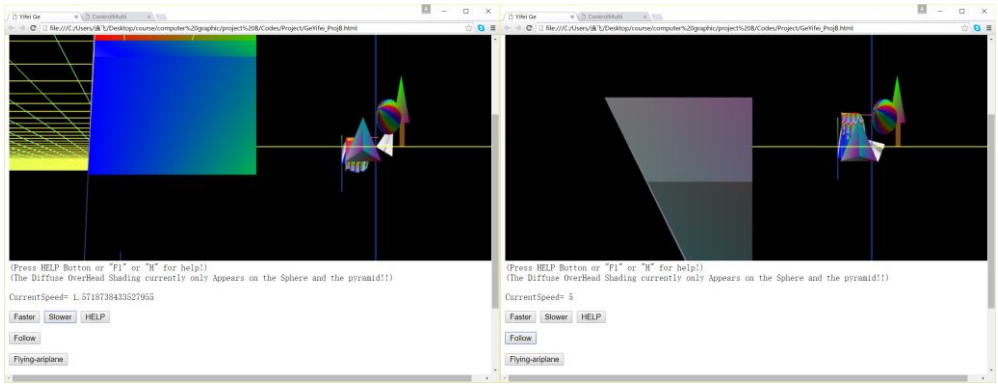
When put into frustum can be adjustable via the 12 buttons in the bottom.

Flying-Airplane



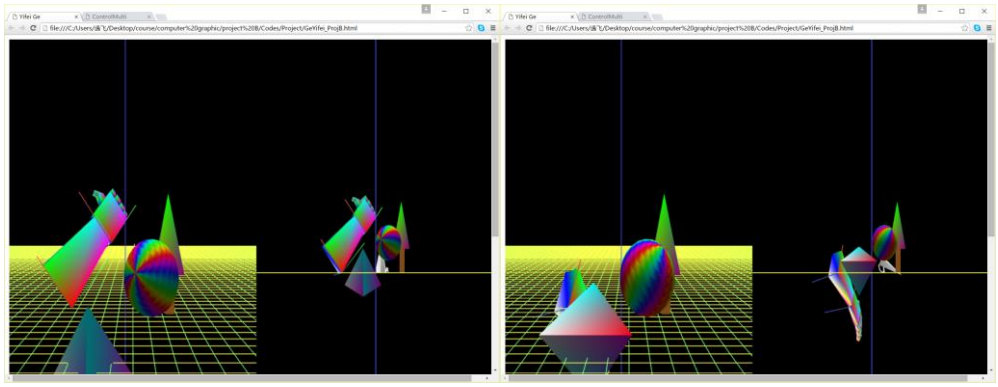
When clicked the Flying airplane button, can just fly the camera as an airplane with JKLI.

Camera on the end segment of the hand:



For better camera effect, the moving speed will be set to 5(a slow speed) when follow clicked. Camera locates on the little finger of the hand.

Quaternion-based trackball control:



The hand track was controlled by mouse dragging based on the quaternion, so it always ball-like.

Scene Graph