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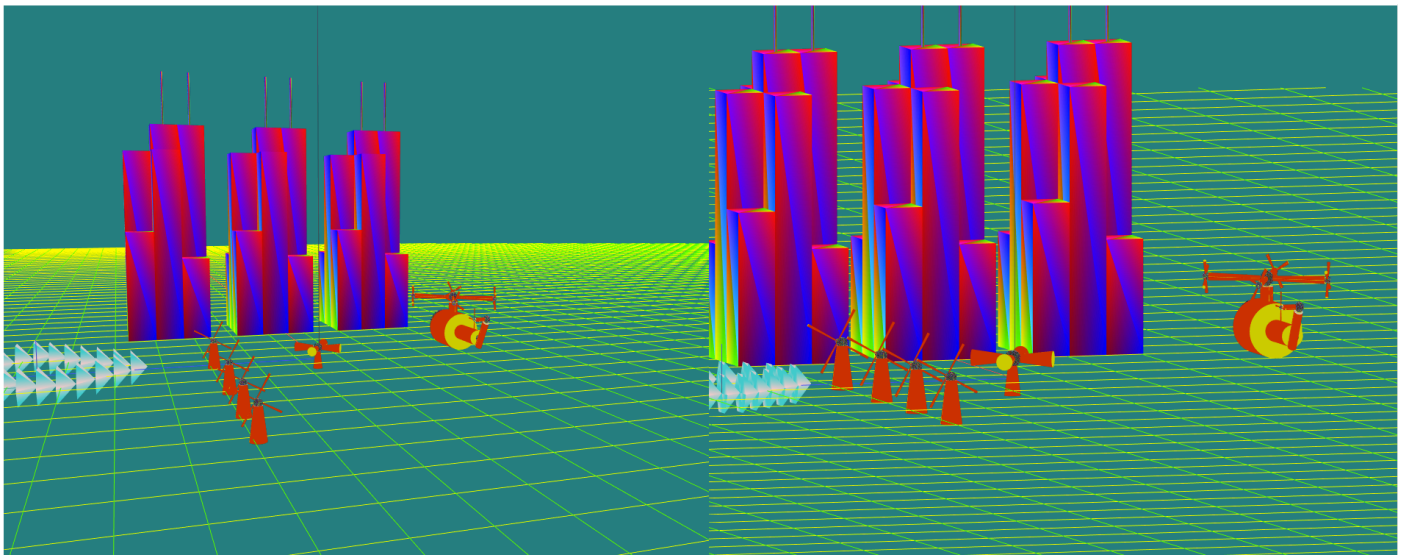
Project B: City Of Chicago in 3D world

Intro:

The design of my project was inspired by the architecture of the downtown Chicago, so we made a 3D world with a camera allows user to move around in the space which contain Willis Tower that's representing the downtown architecture, windmills that generating electric power for the windy city, lighthouse that guides the airplanes in O'hare Airports and a helicopter that can take tourists fly around the city and enjoy the nice view of downtown Chicago.



***Willis Tower**:* I referenced to the diagram from figure 1[1], to create 9 rectangles with different heights, plus two octagons that had been scaled to become two thin and long tentacles that jointed on the top of the buildings.

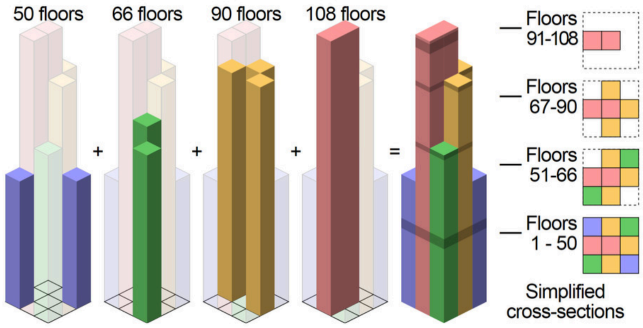


figure 1 [1]

***Diamond ring**:* consists of more than 20 diamonds that draw to shape a ring-like object that implemented the moues-drag rotation with quaternion matrix. There is a axis-attach the ring to give reference for the rotation

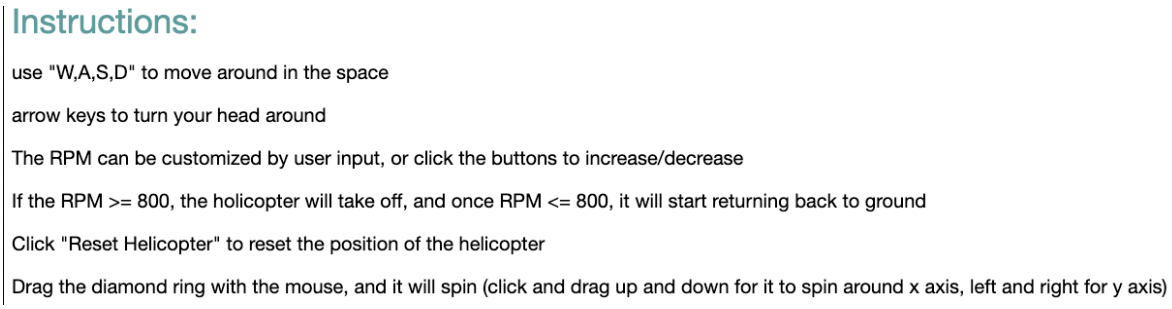
Helicopter **:** Helicopter is made of many cylinders by scaling and rotating, and spheres that are working as connection joint. There are total three sequential joints that connects tail propeller with helicopter body, main propeller with helicopter body, and main propeller with four side-propeller on it.

***Light houser & Windmill**:* Used both cylinder and and sphere to draw light house and windmill, the speed

[1]*Free CAD Designs, Files & 3D Models: The GrabCAD Community Library. (n.d.). Retrieved from https://grabcad.com/library/willis-tower-in-chicago-illinois-1.*

Instruction:

This project is using webGL to draw 3D world on the canvas in a HTML browser(Google Chrome is preferred). We draw two 3D worlds, left screen is draw with perspective view, and the right screen is orthogonal view, but both have the same camera view as we moving and rotation the camera position. Open up the html file called: *HuangZhen_ProjB.htlm* , and you will see a basic instructions of how to control and interact with the 3D world, including mouse dragging, keyboard inputs, and user-input:



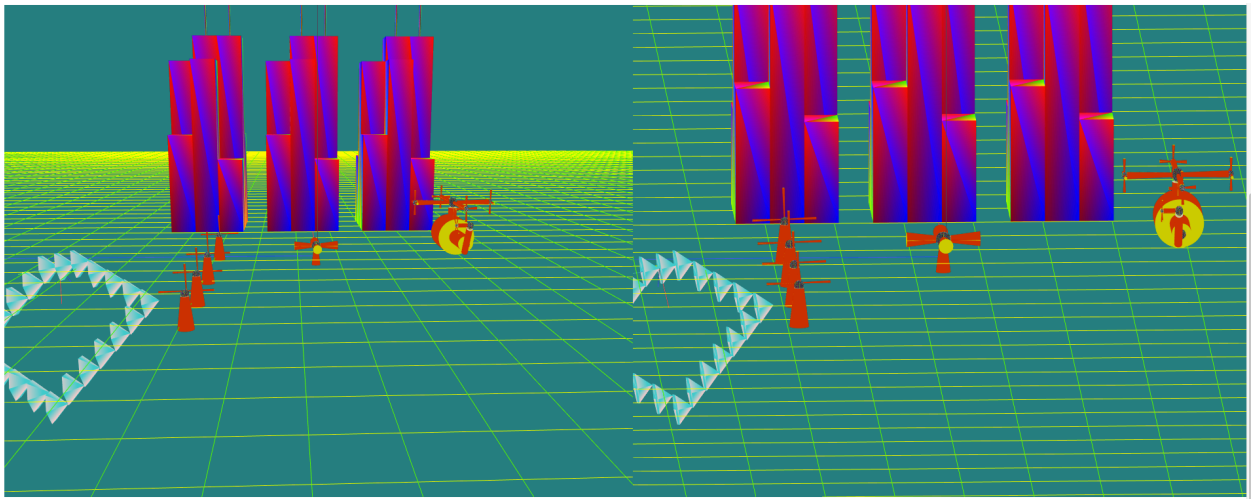
'WASD' and 'up down left right' for navigation control

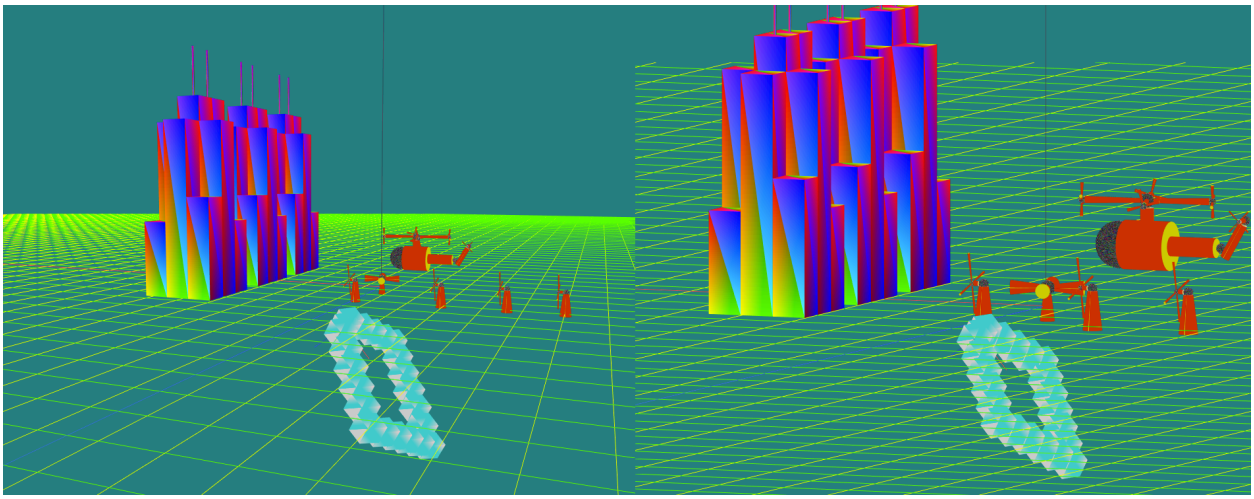
Click '**Spin >>'** or '**spin <<**' to change the RPM. The RPM representing the rotation per minutes, and if the RPM >=800, the helicopter will start ascending , but if it is below 800, the helicopter will descend until it lands. User can also provides the RMP by providing number in the input box. Press the bottom '**Reset Helicopter**' to return it to ground.

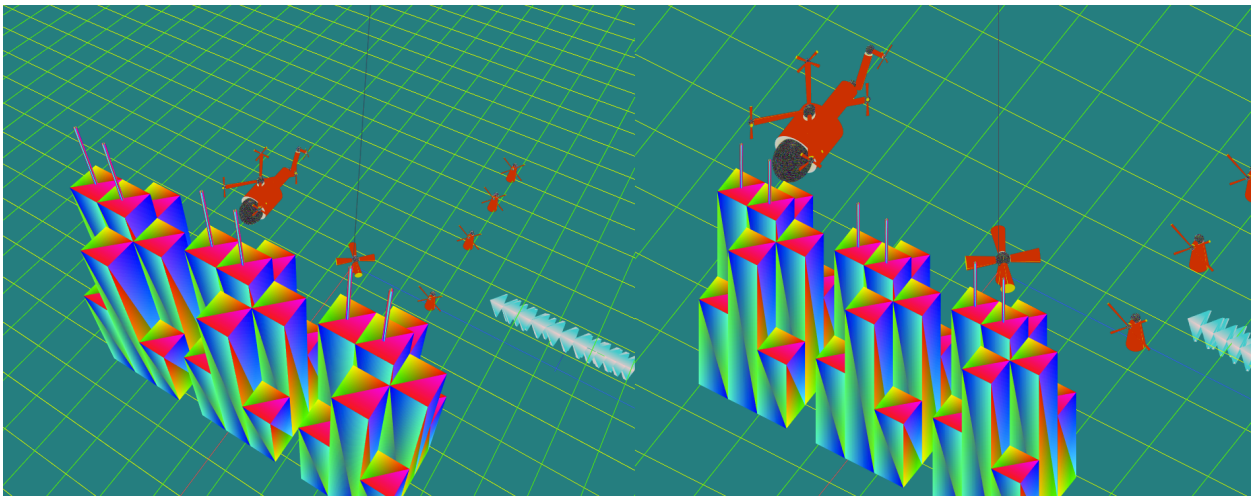
Drag the diamond ring with the mouse, and it will spin according to the mouse drag direction
-click and drag to move along y-axis (up and down) for it to spin around x axis.
-click and drag to move along y-axis (left and right) for it to spin around x axis.

Results:

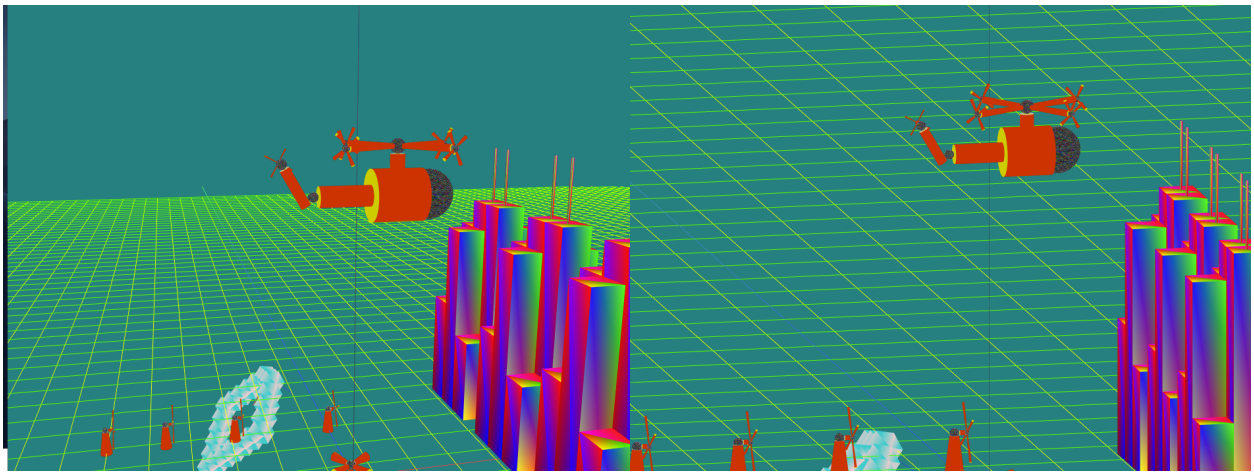
camera Navigation







Helicopter taking off:



mouse drag rotation: