Shortcuts:

- `'g'` → toggle gripper open/closed
- `'d'` → clone end-effector gripper
  - Need to do this once in the beginning to start making adjustments; the UI always sends the LAST recorded gripper pose
- `Backspace/Delete` → will delete the last cloned gripper^^
- `'f'` → move robot slightly forward (i.e. along the current end-effector axis)
- `'b'` → move robot slightly backward
  - ^^I use these 2 heavily for pick&place / opening&closing tasks
- <u>Click and drag the gripper:</u>
  - Naively dragging the gripper will move it wherever (and can be hard to control), but you can hold down `'x'`, `'y'`, or `'z'` to snap along axes:
    - Pressing `'x'` and dragging will only drag along x axis
    - Same applies to holding `'y'` or holding `'z'` (translate along that axis)
  - NOTE: you won't be able to move the very first mesh when the UI loads (this represents current pose)
    - First duplicate it (`'d'`) and then you can do whatever
- <u>Reorient the gripper:</u>
  - `'r'` to enter rotation mode, `'Escape'` to exit rotation mode
    - Can manually drag handles for small changes
    - NOTE (shortcut): `'rx90'` will rotate by x by 90 degrees (same applies to y, z for other values) [TODO: I have yet to implement this for negative numbers, oops]
    - NOTE: If you mess up rotations, it can be hard to get it back into a canonical pose. I recommend just `Backspace/Delete` the current gripper and then re-duplicate (`'d'`) and re-try
- <u>Click a point:</u>
  - Moves gripper in current orientation near the clicked point (shows up in red)
  - NOTE: This feature doesn't work well near the gripper (I have some checks to ignore clicks that are intersecting with the gripper)
    - To do this, I usually click/drag the gripper arbitrarily out of the way, zoom/tilt at the point I want, and click to bring the gripper back to where I want
- <u>Camera positioning:</u>
  - `'t'` snaps to top view
  - `'s'` snaps to side view
  - `Shift + mouse drag` → pan/tilt
  - `Scroll (wheel)` → zoom in
    - I use these 2 features heavily to click points accurately
- <u>Recording:</u>
  - `'Record waypoint'` → moves the robot to the *last* recorded robot pose in the interface

- ○ `'End episode'` → resets the robot (open gripper, move back to home)

Example (Cabinet Opening): I usually do this sequence:
- First waypoint:
  - ○ 'd' to initially duplicate the original gripper
  - ○ 'rx90' to rotate the gripper sideways
  - ○ 't' to view the gripper top-down, and use the green handle to align the robot in the direction of the cabinet
  - ○ Use 'Shift' + mousewheel to pan over to the cabinet, and Scroll to zoom in on the handle, then click on the handle
    - ■ Note: you may need to drag the gripper a little bit away before pressing on the cabinet handle since clicks that intersect with the gripper (from the current viewpoint) are ignored
  - ○ Press 'g' to toggle the gripper open
  - ○ → Hit 'Record Waypoint' to have the robot move there
- Second waypoint:
  - ○ 'f' to move forward (this avoids the need to translate along xyz axes individually)
  - ○ Press 'g' to grasp
  - ○ → Hit 'Record Waypoint' to have the robot move there
  - ○ Note:
    - ■ This sometimes fails to grasp! So I sometimes use the Spacemouse to re-try
    - ■ You can also use the spacemouse entirely for grasping & pulling the cabinet if you prefer
- Third waypoint:
  - ○ 'b' to move backward
  - ○ → Hit 'Record Waypoint' to have the robot move there
- → Hit 'End episode'
- Hit 'Enter' in the terminal to save demo
  - ○ Need to refresh page after each new saved demo, otherwise "Record Waypoint" button saves demo directly

Example: