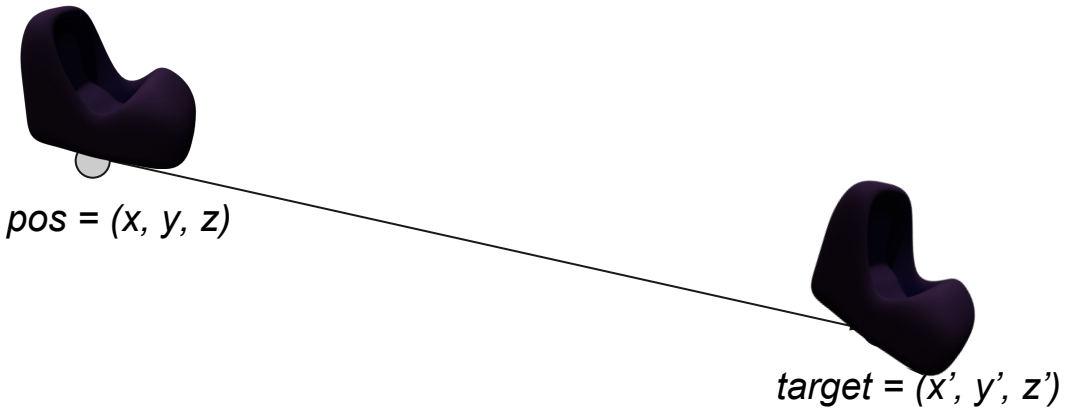
CSE 167 Discussion #8

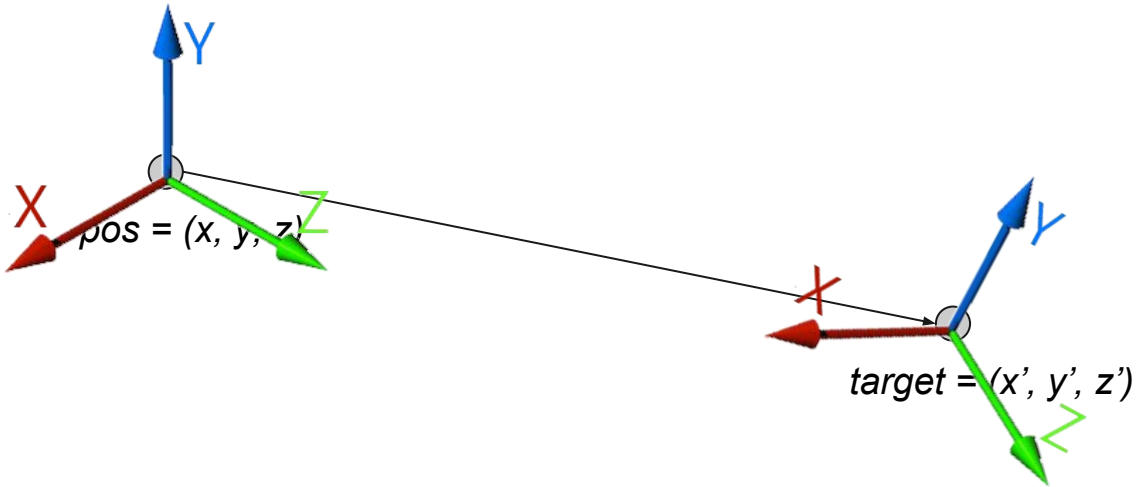
I’m the only human who can do it

Coaster Orientation



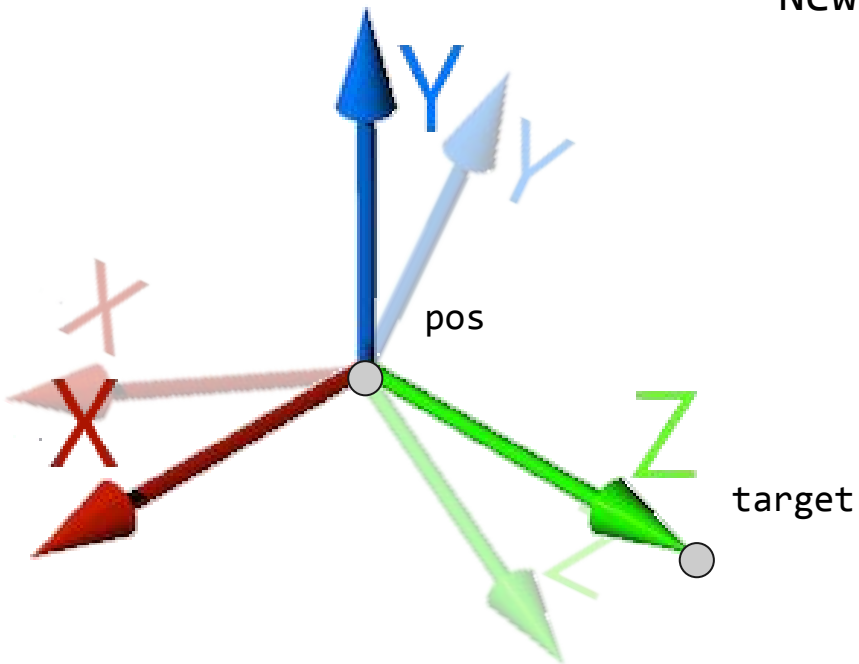
Coaster Orientation

Rotation &
Translation

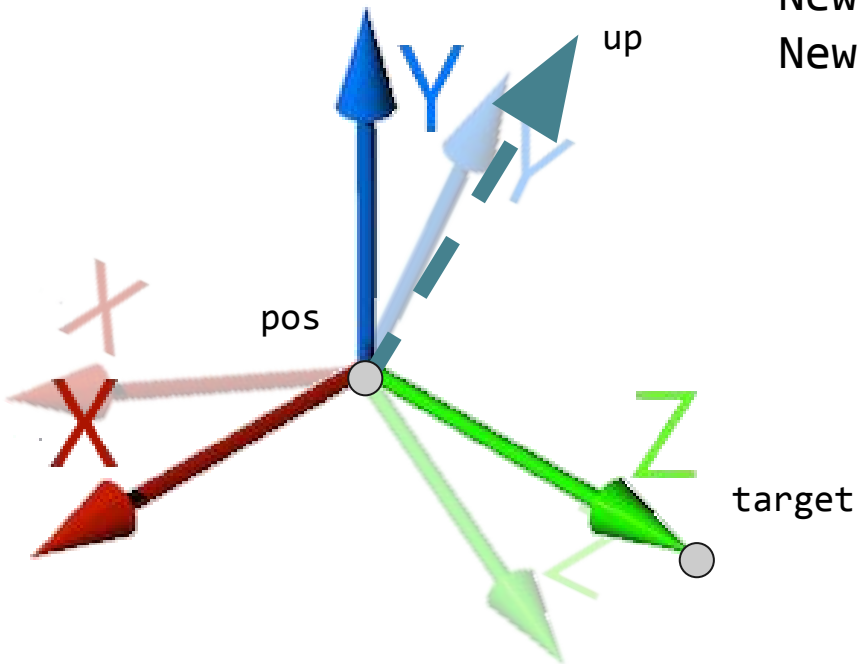


Coaster Rotation

New Z = normalize(target - pos)

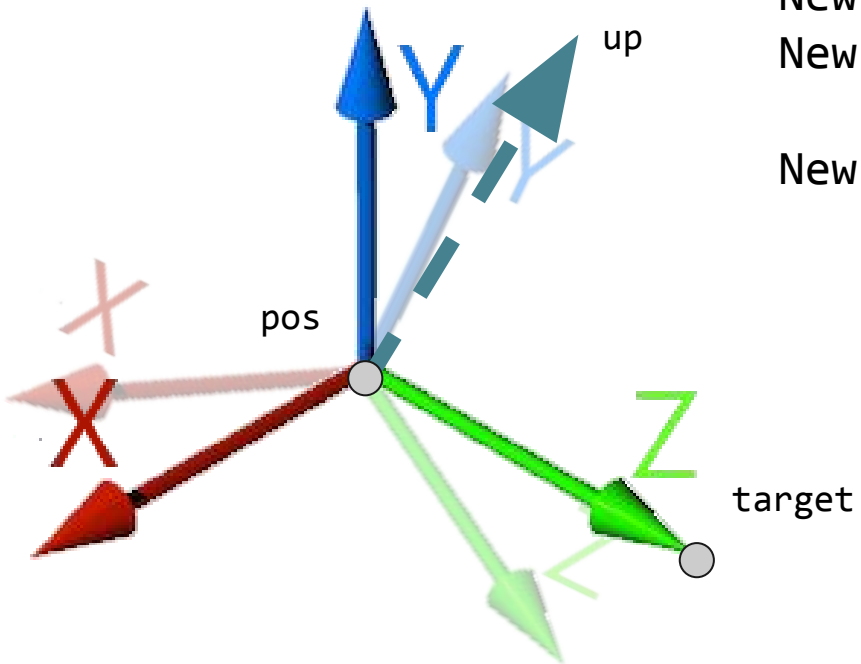


Coaster Rotation



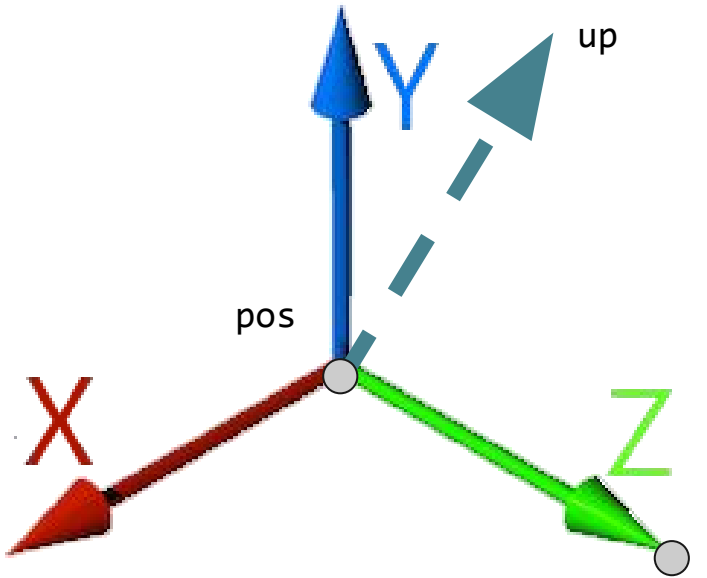

```
New Z = normalize(target - pos)
New X = normalize(cross(<0, 1, 0>,
        New Z))
```

Coaster Rotation




```
New Z = normalize(target - pos)
New X = normalize(cross(<0, 1, 0>,
        New Z))
New Y = normalize(cross(New Z,
        New X))
```

Coaster Rotation




```
New Z = normalize(target - pos)
New X = normalize(cross(<0, 1, 0>,
        New Z))
New Y = normalize(cross(New Z,
        New X))
```

Construct the transformation matrix, given New (X, Y, Z) and pos

Moving Points

z-axis

$$z_C = \frac{e - d}{\|e - d\|}$$

x-axis

$$x_C = \frac{up \times z_C}{\|up \times z_C\|}$$

y-axis

$$y_C = z_C \times x_C = \frac{up}{\|up\|}$$

$$C = \begin{bmatrix} x_C & y_C & z_C & e \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Moving Points

- If we take our control point's position and add the camera's scaled x-axis and scaled y-axis, we can move the control point in the camera's x-y plane
  - control_pos = control_pos + $s_{x\text{-}axis}$ * x-axis + $s_{y\text{-}axis}$ * y-axis