CS 420 9/17

Chapter 5 - Frames in Graphics

Frames

$\vec{w}^t$ - World

$\vec{o}^t$ - Object 1 per object

$\vec{e}^t$ - Eye, or Camera

(see figure)

Moving an object in a rational way involves the use of an auxiliary frame with $\vec{o}^t$'s origin and $\vec{e}^t$'s orientation (rotation)

$\therefore$ $\vec{a}^t$ should have $\vec{o}^t$'s translation and $\vec{e}^t$'s rotation

Remember "transfact" and "linfact" from Ch. 3:

$$A = TL \quad \text{or} \quad A = TR$$

$$\vec{o}^t = \vec{w}^t O = \vec{w}^t (O)_T (O)_R$$

$$\vec{e}^t = \vec{w}^t E = \vec{w}^t (E)_T (E)_R$$

$$\vec{a}^t = \vec{w}^t (O)_T (E)_R = \vec{w}^t A$$

$$\therefore \quad A = (O)_T (E)_R$$

Figures

To apply a transformation M :

$$O \leftarrow A M A^{-1} O$$

Yesterday's "do M to O wrt A"

"Ego" motion :

$$E \leftarrow E M$$

For an object that is composed of sub-objects, it can be useful to define sub-object frames relative to other sub-object frames (figure)

$$\vec{o}^t = \vec{w}^t O$$

$$\vec{a}^t = \vec{o}^t A = \vec{w}^t O A$$

$$\vec{b}^t = \vec{a}^t B = \vec{o}^t A B = \vec{w}^t O A B$$

$$\ldots$$