

Perspective Projections

Thomas J. Peters

Department of Computer
Science and Engineering
University of Connecticut
Storrs, CT 06269-3155
tpeters@cse.uconn.edu
860-486-5045

Matrix

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

Matrix and Vector

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \\ 1 \end{pmatrix}$$

Product

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \\ 1 \end{pmatrix} = \begin{pmatrix} x \\ y \\ 0 \\ z \end{pmatrix}$$

Implication to 3D co-ordinates

$$\begin{pmatrix} x \\ y \\ 0 \\ z \end{pmatrix}$$

Yields the following 3-tuple

$$\begin{pmatrix} x/z \\ y/z \\ 0 \end{pmatrix}$$

- z better not be zero
- farther z co-ordinate is larger z value and reduces x and y more than a closer z co-ordinate does.