42-1

: constant acceleration

$$\begin{bmatrix} x \\ \dot{x} \\ \ddot{x} \end{bmatrix}_{i+1} = \begin{bmatrix} 1 & T & \frac{1}{2}T^2 \\ 0 & 1 & T \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ \dot{x} \\ \ddot{x} \end{bmatrix}_i$$

constant velocity

$$\begin{bmatrix} x \\ \dot{x} \end{bmatrix}_{i+1} = \begin{pmatrix} 1 & T \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ \dot{x} \end{pmatrix}_i$$

Dec 5-9:22 AM

42-2

$$\begin{bmatrix} x \\ \dot{x} \\ y \\ \dot{y} \end{bmatrix}_{i+1} = \begin{bmatrix} 1 & T & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & T \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ \dot{x} \\ y \\ \dot{y} \end{bmatrix}_i$$

$$\begin{bmatrix} x \\ \dot{x} \\ y \\ \dot{y} \\ z \\ \dot{z} \end{bmatrix}_{i+1} = \begin{bmatrix} 1 & T & & & & \\ 0 & 1 & & & & \\ & & 1 & T & & \\ & & 0 & 1 & & \\ & & & & 1 & T \\ & & & & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ \dot{x} \\ y \\ \dot{y} \\ z \\ \dot{z} \end{bmatrix}_i$$

Dec 5-9:23 AM

42-3

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix}_{i+1} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} X \\ Y \\ Z \end{pmatrix}_i$$

stationary not moving object or vehicle

what if erratic motion?

maybe: be adaptive with choice of state vector & transition matrix

Dec 5-9:23 AM