



$\dot{x} = \dot{x}_0$   
 $\dot{y} = \dot{y}_0$   
 $\dot{\theta} = \dot{\theta}$

$\dot{x} = u \cdot \cos(\theta)$   
 $\dot{y} = u \cdot \sin(\theta)$   
 $\dot{\theta} = \omega$

$v(t) = \frac{u_{TL}}{R - L/2}$   
 $\omega(t) = \frac{u_{TR}}{R + L/2}$

$\omega(t) = \frac{u_{RT} - u_{LT}}{L}$   
 $u = \frac{u_{RT} + u_{LT}}{2}$

$u_{RT} = \omega_{RT} \cdot R$   
 $u_{LT} = \omega_{LT} \cdot L$

$\omega_{RT} = \frac{u_{RT}}{R}$   
 $\omega_{LT} = \frac{u_{LT}}{L}$

$\omega = \frac{u_{RT}}{R} - \frac{u_{LT}}{L}$   
 $u = \frac{u_{RT} + u_{LT}}{2}$

$\begin{bmatrix} u \\ \omega \end{bmatrix} = \begin{bmatrix} 1/2 & 1/2 \\ 1/L & -1/L \end{bmatrix} \begin{bmatrix} u_{RT} \\ u_{LT} \end{bmatrix}$

$u_{RT} = \omega_{RT} \cdot R$   
 $u_{LT} = \omega_{LT} \cdot L$

$\begin{bmatrix} u_{RT} \\ u_{LT} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \omega_{RT} \\ \omega_{LT} \end{bmatrix}$

$u_{RT} = R \cdot \omega_{RT}$   
 $u_{LT} = L \cdot \omega_{LT}$

$v = B_{uT}$   
 $u = B \cdot R \cdot \omega$

$$\begin{pmatrix} \dot{h}_x \\ \dot{h}_y \\ \dot{\theta} \end{pmatrix} = \begin{pmatrix} \cos(\omega) & r & 0 \\ \sin(\omega) & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} \omega \\ v \\ \omega \end{pmatrix}$$

$$\dot{h} = J \cdot v$$

$$3 \times 2 \quad 2 \times 1$$

$$3 \times 1 \quad 2 \times 1$$

$$v = R \cdot \omega$$

$$T^{-1} v = T^{-1} T \omega$$

$$v = T \omega$$

$$\omega = T^{-1} v$$

$$\begin{pmatrix} \dot{h}_x \\ \dot{h}_y \\ \dot{\theta} \end{pmatrix}$$

$$F(\theta, \dot{\theta})$$

$$\begin{pmatrix} \dot{h}_x \\ \dot{h}_y \\ \dot{\theta} \end{pmatrix}$$

$$\int$$

$$\begin{pmatrix} \dot{h}_x \\ \dot{h}_y \\ \dot{\theta} \end{pmatrix}$$

$$\begin{pmatrix} \dot{h}_x \\ \dot{h}_y \\ \dot{\theta} \end{pmatrix}$$

$$T$$

$$\begin{pmatrix} \dot{h}_x \\ \dot{h}_y \\ \dot{\theta} \end{pmatrix}$$

