??
v_L
v_R
R_L
R_R
w
??
v_L
R_L
R_R
v_R
$\dot{\theta} =$
$\frac{v_L}{R_L} =$
$\frac{v_R}{R_R}$
$R_R =$
$R_L +$
W

$$\dot{\theta} = \frac{v_R - v_L}{W} = \frac{v_\Delta}{W} \quad (1)$$

$\dot{x} = v\,cos(\theta)$ (2)
$\dot{y} = v\,sin(\theta)$ (3)
$\dot{\theta} = \omega = \frac{v_\Delta}{W}$

(4)

$$v = \frac{v_R + v_L}{2} \quad (5)$$

??
$10 (x, y, \theta)$
V
ω
$_v elocity.[h][width =$
$]sections/assets/omegaCtrlr.png Overview of the systems block diagram where the angular velocity \omega$

$$\dot{\theta} = \omega \quad (6)$$

$$s \cdot \Theta(s) = \Omega(s) \quad (7)$$

$G(s)$

$$G(s) = \frac{\Omega(s)}{s \cdot \Theta(s)} = 1 \quad (8)$$

θ
PID
$G(s)$
$\frac{1}{s}$
$U(s)$
$Y(s)$
$-$

$$G_c(s) = \frac{PID}{s + PID} \quad (9)$$

$$G_c(s) = \frac{K_p}{s + K_p} \quad (10)$$

$-K_p$
$_P ID.PNG The complete control block for the angular position in discrete time domain.$
θ
θ_e
$(-\pi, \pi]$
$\theta =$
$\theta \pm$
$2 \cdot$
π

$$\theta = atan2(\sin(\theta), \cos(\theta)) \quad (11)$$

θ
$(-\pi, \pi]$
??
$(-10, 10)_p i_s tep response.png The step response for \theta$
$K_p =$
4
4
??
(x, y)
ω
v
`AverageVelocity`
`Desired_Theta`
`X`
`Y`
??