L59 Angular Velocity

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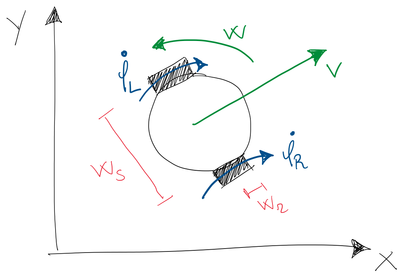

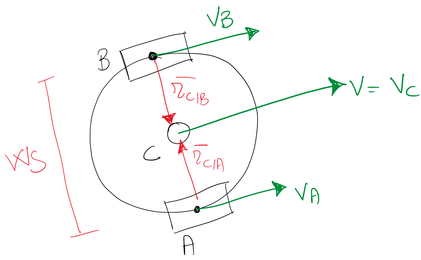

$$\begin{cases} V_A = W_2\,\dot{\varphi}_R \\ V_B = W_2\,\dot{\varphi}_L \end{cases} \longrightarrow V_C \; ?$$

$$\begin{cases} \bar{V}_C = \bar{V}_A + \bar{\omega} \times \bar{r}_{C1A} \\ V_C = \bar{V}_B + \bar{\omega} \times \bar{r}_{C1B} \end{cases}$$

(+)

$$2V_C = V_A + V_B + \omega \times (\bar{r}_{C1A} + \bar{r}_{C1B}) \qquad (\bar{r}_{C1A} + \bar{r}_{C1B} = 0)$$

$$V_C = \frac{V_A + V_B}{2}$$

(1)

$$V = \frac{W_2\,\dot{\varphi}_R}{2} + \frac{W_2\,\dot{\varphi}_L}{2}$$

(−)

$$0 = \bar{V}_A - \bar{V}_B + \bar{\omega} \times (\bar{r}_{C1A} - \bar{r}_{C1B}) \qquad (\bar{r}_{C1A} - \bar{r}_{C1B} = W_S)$$

$$\omega = \frac{V_B - V_A}{W_S}$$

Differential Drive

(2)

$$\omega = \frac{W_2\,\dot{\varphi}_L}{W_S} - \frac{W_2\,\dot{\varphi}_R}{W_S}$$

$$\begin{bmatrix} V \\ \omega \end{bmatrix} = \begin{bmatrix} \frac{W_2}{2} & \frac{W_2}{2} \\ \frac{W_2}{W_S} & -\frac{W_2}{W_S} \end{bmatrix} \begin{bmatrix} \dot{\varphi}_R \\ \dot{\varphi}_L \end{bmatrix}$$

M_S

Robot Velocity

Wheels Velocities

$$\begin{bmatrix} \dot{\varphi}_R \\ \dot{\varphi}_L \end{bmatrix} = M_S^{-1} \begin{bmatrix} V \\ \omega \end{bmatrix}$$