

*the three wheeled robot with $\dot{V}_x, \dot{V}_y, \dot{\phi}$: the $X -$ coordinate velocity ,
the $y -$ coordinate velocity , corresponding angle respectively,
the linear velocity for each motor can be derived from the
following equation:*

$$\begin{bmatrix} V1 \\ V2 \\ V3 \end{bmatrix} = \begin{bmatrix} -\sin(\phi + \alpha1) & \cos(\phi + \alpha1) & R \\ -\sin(\phi + \alpha2) & \cos(\phi + \alpha2) & R \\ -\sin(\phi + \alpha3) & \cos(\phi + \alpha3) & R \end{bmatrix} \begin{bmatrix} \dot{x} \\ \dot{y} \\ \dot{\phi} \end{bmatrix}$$

$V1, V2, V3$: linear velocities for each wheel respectively

$$\alpha1 = 0, \alpha2 = 120, \alpha3 = 240, R = 20cm$$

We can get the angular velocity for each wheel from the following rule:

$$\begin{bmatrix} \omega1 \\ \omega2 \\ \omega3 \end{bmatrix} = \frac{1}{R} \begin{bmatrix} V1 \\ V2 \\ V3 \end{bmatrix}$$

$\omega1, \omega2, \omega3$ the three angular velocities for each wheel respectively