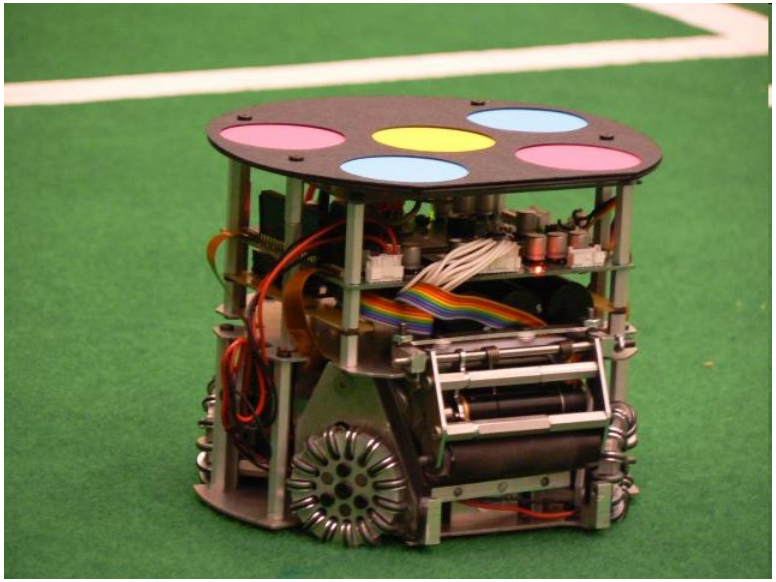
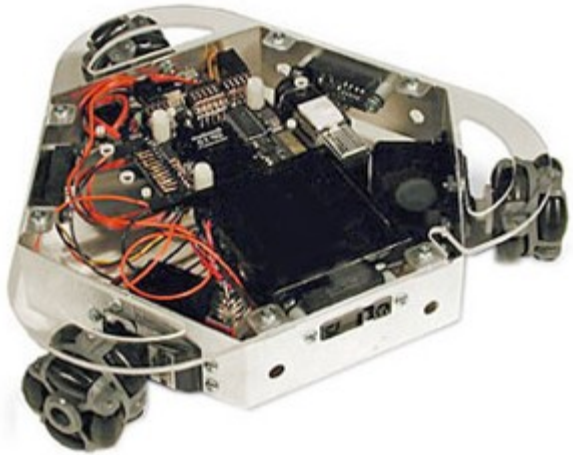
Holonomic Robots





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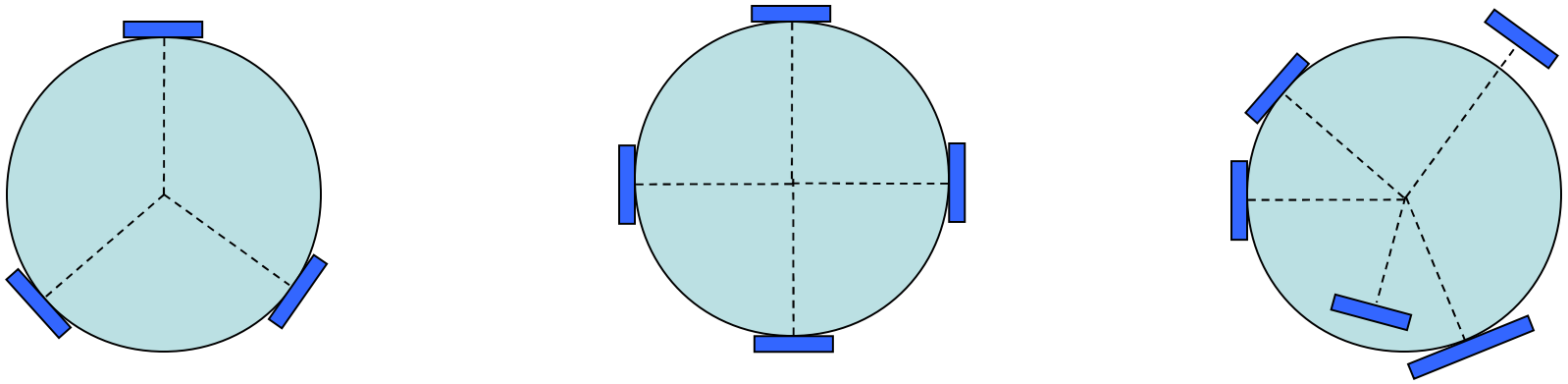
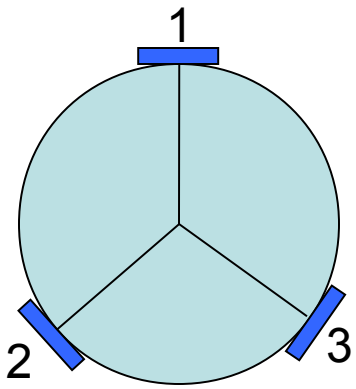
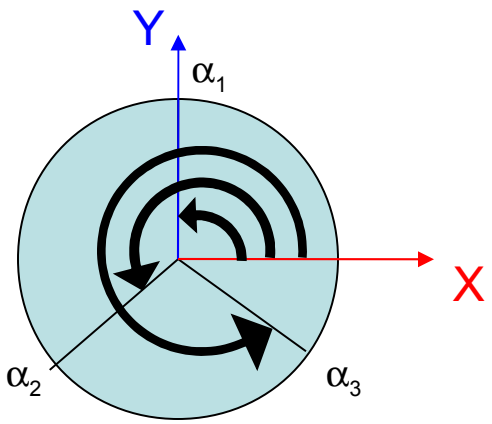


- Variable number of wheels, radius, and wheel sizes are possible



- We will examine a 3 wheel robot

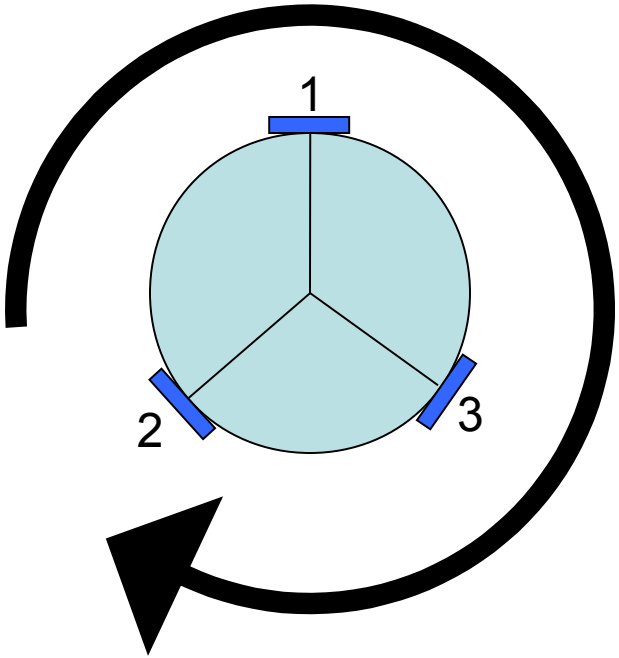


- Create a coordinate system
- Record angle to each wheel: α_1 α_2 α_3

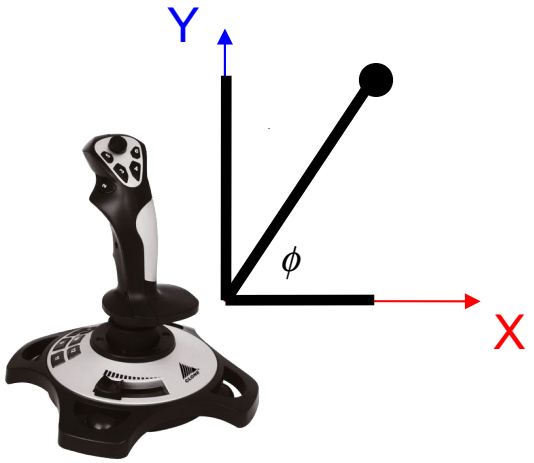
M_1 = +

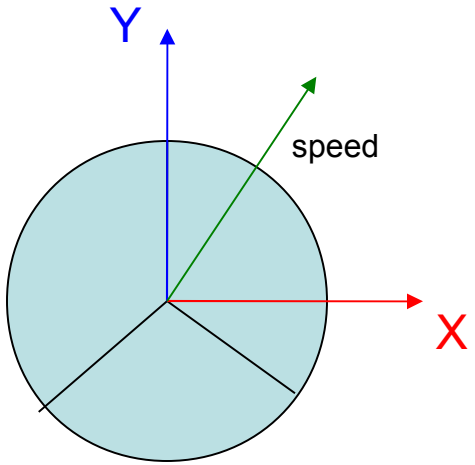
M_2 = +

M_3 = +



- Positive values sent to wheels spin robot clockwise

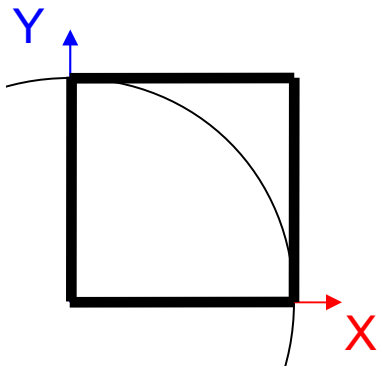


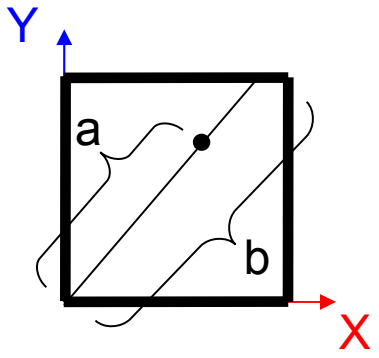


- Direction vector from joystick
- Angle ϕ = atan2(Y joystick , X joystick);
- Scale vector such that length = speed

Warning:

$$\sqrt{Ymax^2 + Xmax^2} > Ymax$$

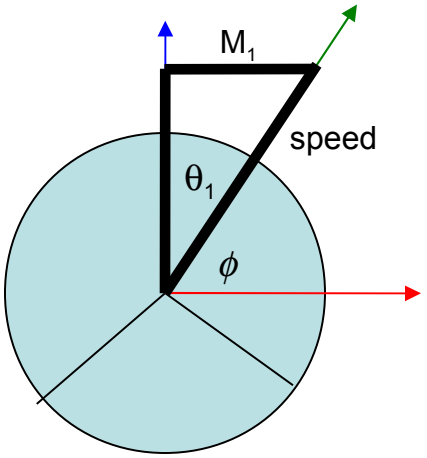




$$a = \sqrt{Yjoystick^2 + Xjoystick^2}$$

$$speed = maxspeed \cdot {}^{a}/_{b}$$

Wheel 1



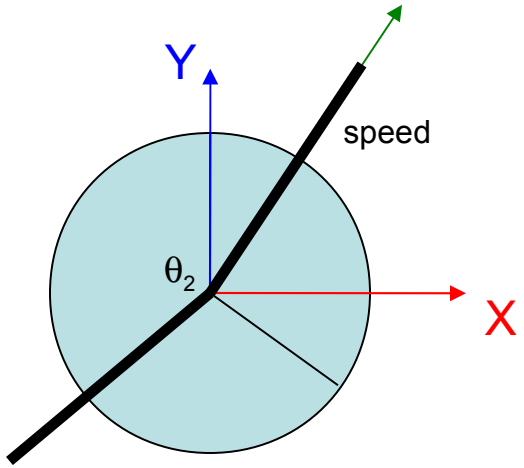
$$\theta_1 = \alpha_1 - \phi$$

$$\sin(\theta_1) = \frac{M_1}{\text{speed}}$$

$$M_1 = \text{speed} \cdot \sin(\theta_1)$$

Sanity check: sin(θ = 0) = 0, sin(θ = 90°) = 1 = full speed, sin(θ = -) = -

Wheel 2

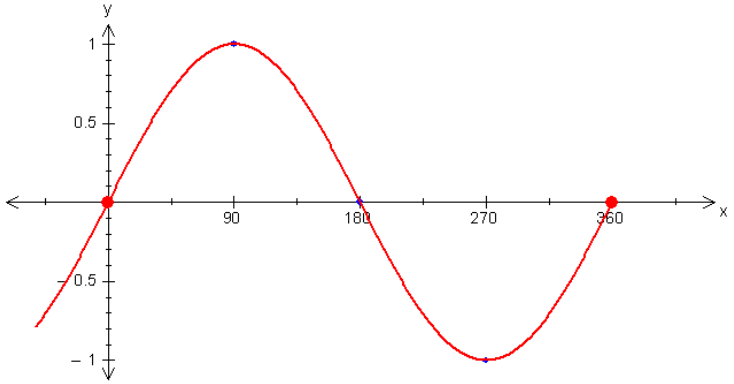


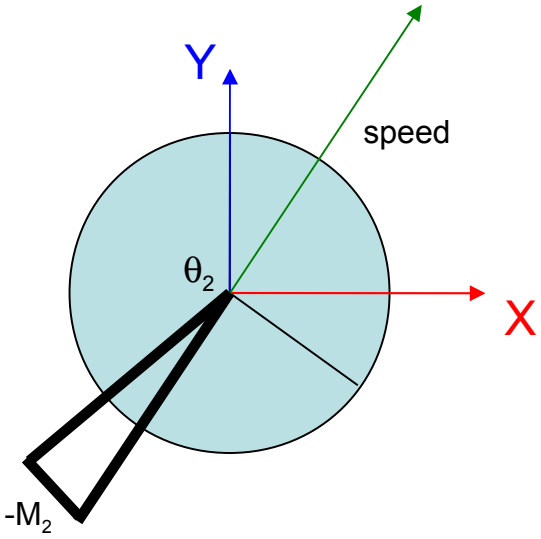
$$\theta_2 = \alpha_2 - \phi$$

$$M_2 = \text{speed} \cdot \sin(\theta_2)$$

Same equation!

Wheel 2





$$\sin(\theta + 180) = -\sin(\theta)$$