Master on Robotics: Perception Systems - Exercise 1.1

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1 Exercise 1

If you have a mobile robot with wheels of radius R=0.4m, and it can run at maximum speed of 3m/s, compute how many pulses will receive a counter if you use an encoder of 500ppr.

- r = 0.4m
- v = 3 m/s
- 500 pulses per revolution

Given the relationship between angular velocity and linear velocity:

$$\omega = \frac{v}{r} = \frac{3}{0.4} = 7.5\ rad/s \tag{1}$$

And given the relationship between angular velocity and frequency of rotation:

$$f = \frac{\omega}{2\pi} = \frac{7.5}{2\pi} \approx 1.19\ revolutions\ per\ second \tag{2}$$

We can compute the number of pulses per second received by our encoder:

$$result = \frac{pulses}{revolution} \times \frac{revolutions}{second} = 500 \times 1.19 \approx 595\ pulses\ per\ second \tag{3}$$