Determing Current Position of a Mecanum Robot From Wheel Speeds Over Time

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1 Definitions

- Let v be a function that takes $\mathbb{R}$ — a time — and returns $\mathbb{R}^4$ — the velocity of each wheel obtained by sensor data.
- Let r be a function that takes $\mathbb{R}^4 * \mathbb{R}$ — the velocity of each wheel and the abosolute angle of the robot — and returns $\mathbb{R}^2 * \mathbb{R}$ — the velocity of the robot and the rotational velocity of the robot.
- Let n be a function that takes $\mathbb{R}^4$ — the velocity of each wheel — and returns $\mathbb{R}$ — the rotational velocity of the robot.
- Let k be a function that takes $\mathbb{R}$ — a time — and returns $\mathbb{R}^2 * \mathbb{R}$ — the velocity of the robot and the rotational velocity of the robot

2 Forward Kinematics

The goal of forward kinematics is to find k — where the robot is given a time. This can be found with

$$k(t) = \left(r\left(v\left(t\right), \int_0^t n\left(x\right) dx \right), n\left(t\right) \right)$$