

lab2 Part1

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Differential Drive

- Advantages

Degree of mobility is 2, is flexible.

Simple structure

Low cost

Easy to control

High workload

- Limits

Can not move to any direction, need to move forward to change direction

Need to have accurate information about the wheels to navigate properly

Simulation

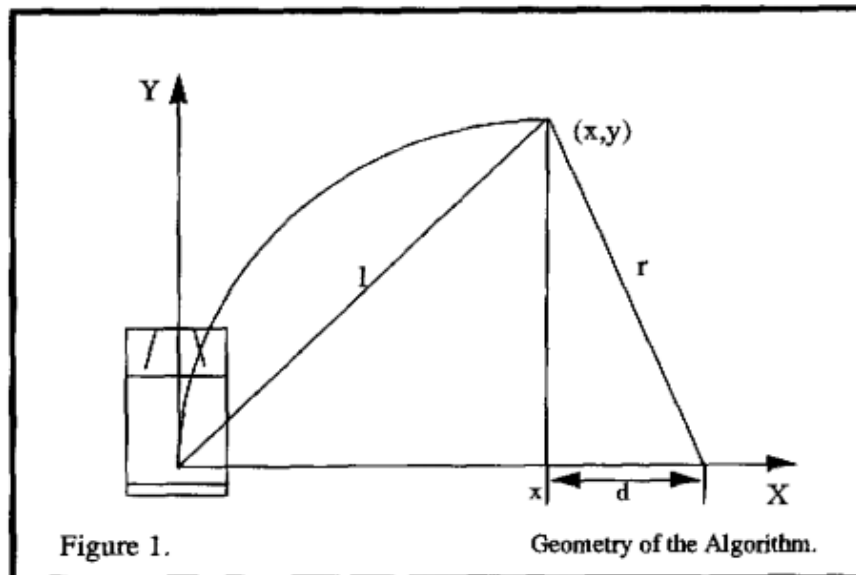
Pure Pursuit Algorithm

- First, find the look ahead point, which is on the path.
- Then based on the look ahead point and current position to calculate the velocity and angular velocity.

Calculation process

reference: [Implementation of the Pure Pursuit Path Tracking Algorithm](#)

slightly different from the toolbox's controller



The following two equations hold. The first is from the geometry of the smaller right triangle in Figure 1. The second from the summing of line segments on the x axis.

$$x^2 + y^2 = l^2 \quad (2.1)$$

$$x + d = r \quad (2.2)$$

- Equation (2.1) describes the circle of radius l about the origin. This is the locus of possible goal points for the vehicle.

- Equation (2.2) describes the relationship between the radius of the arc that joins the origin and the goal point, and the x offset of the goal point from the vehicle. This equation simply states that the radius of the arc and the x offset are independent and differ by d .

The next series of equations relate the curvature of the arc to the lookahead distance. The algebra is straightforward and requires no further explanation.

$$d = r - x$$

$$(r - x)^2 + y^2 = r^2$$

$$r^2 - 2rx + x^2 + y^2 = r^2$$

$$2rx = l^2$$

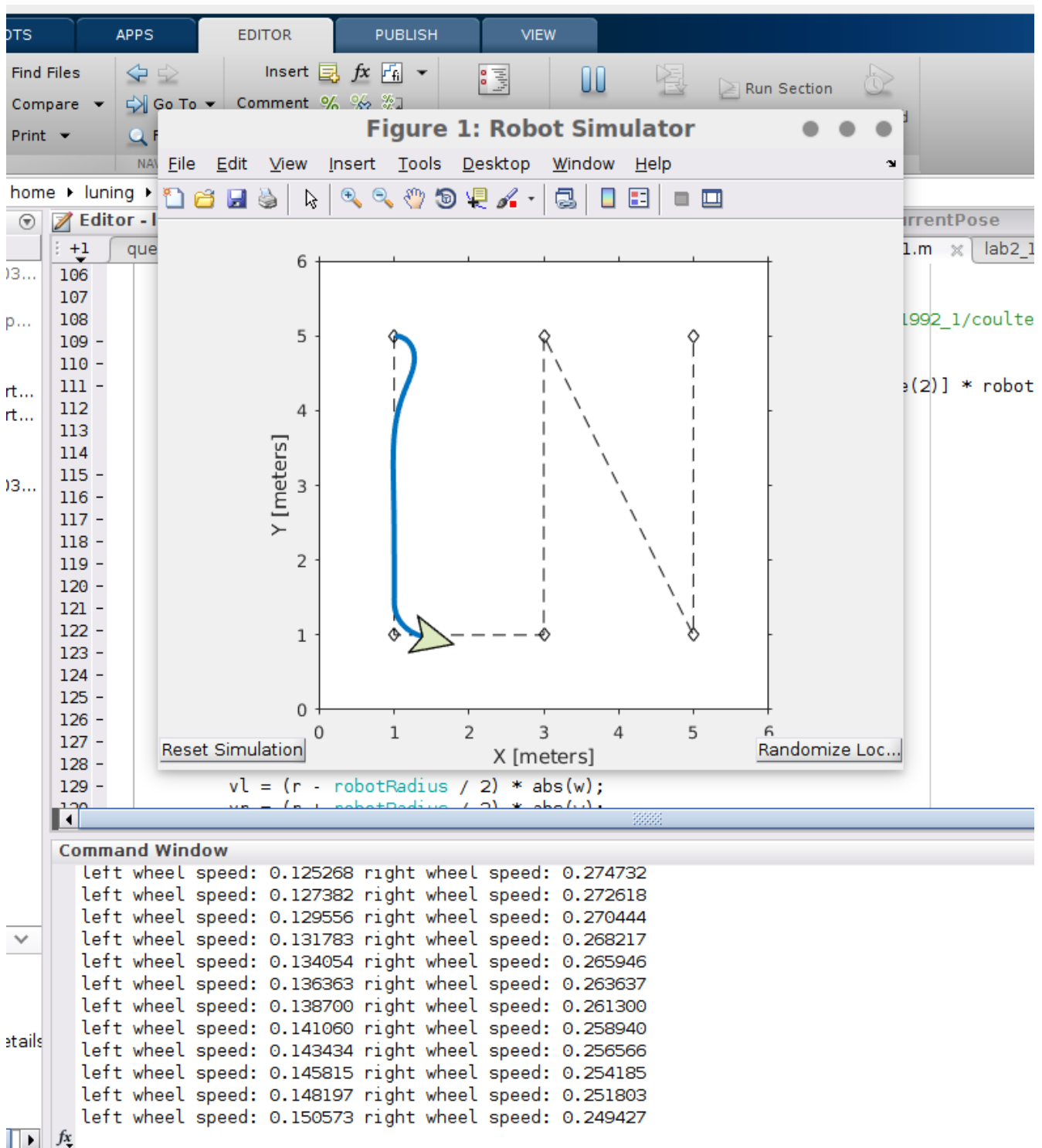
$$r = \frac{l^2}{2x}$$

$$\gamma = \frac{2x}{l^2}$$

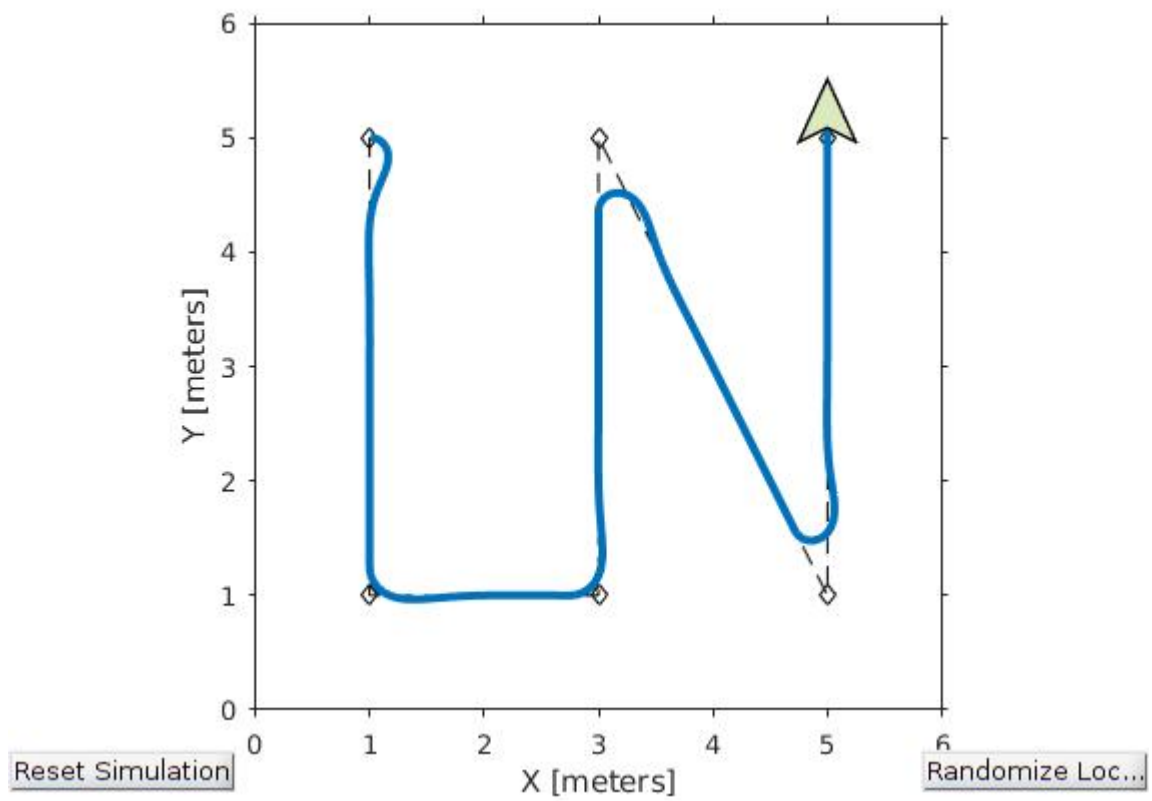
Result

Character 'LN'

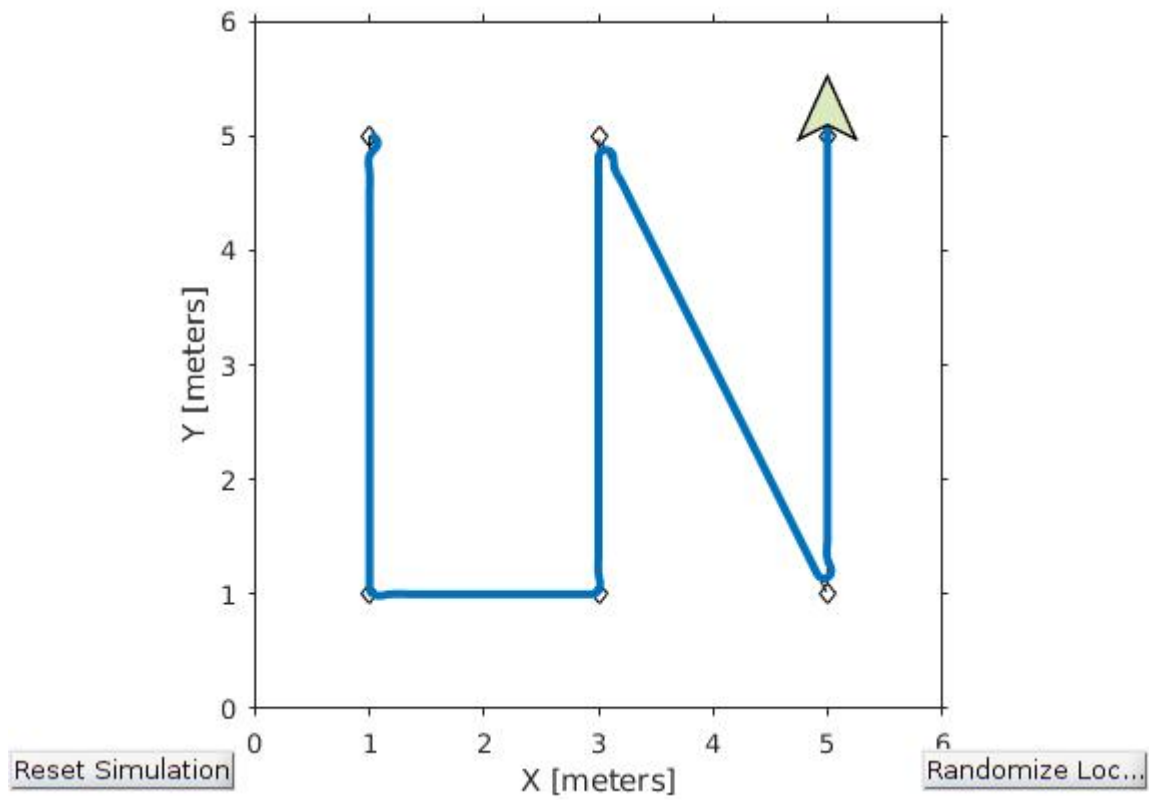
running and print left/right wheel speed



look ahead distance = 0.3



look ahead distance = 0.1



look ahead distance = 0.5

