

Following Walls

Control of Mobile Robots: Programming & Simulation Week 6



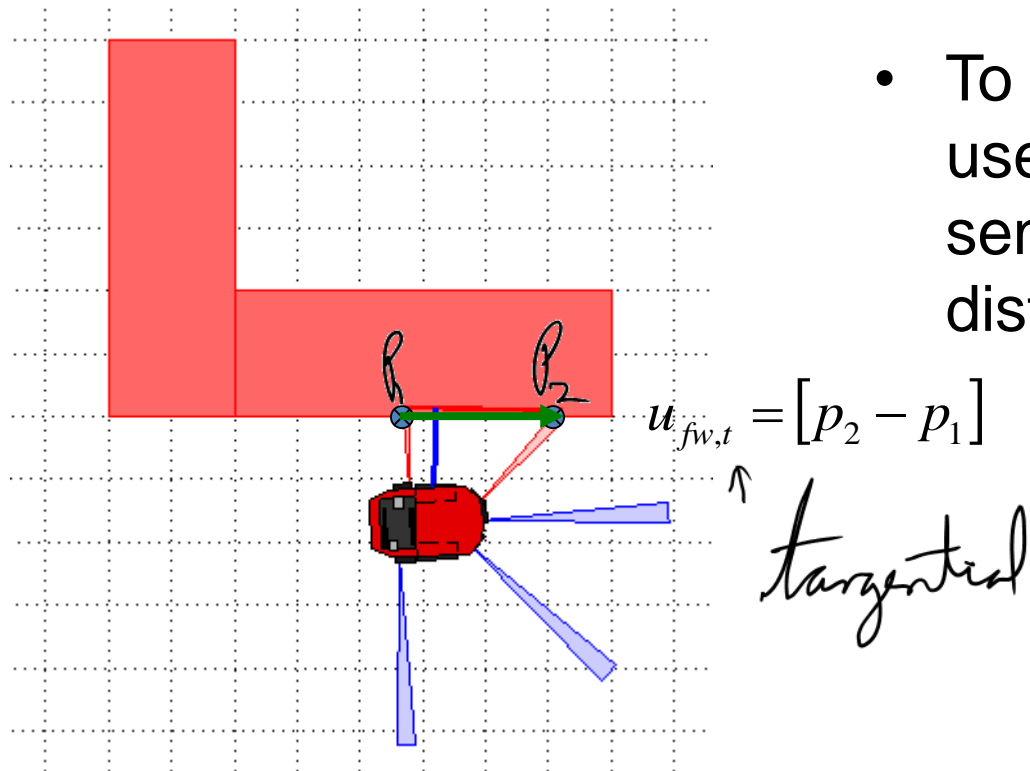
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Overview

- This week we will add a new controller to follow walls.
 1. Estimate a section of a wall (obstacle) using the IR sensors.
 2. Compute a vector tangential to the wall and perpendicular to the wall.
 3. Combine the two vectors and steer in the direction of this new vector.

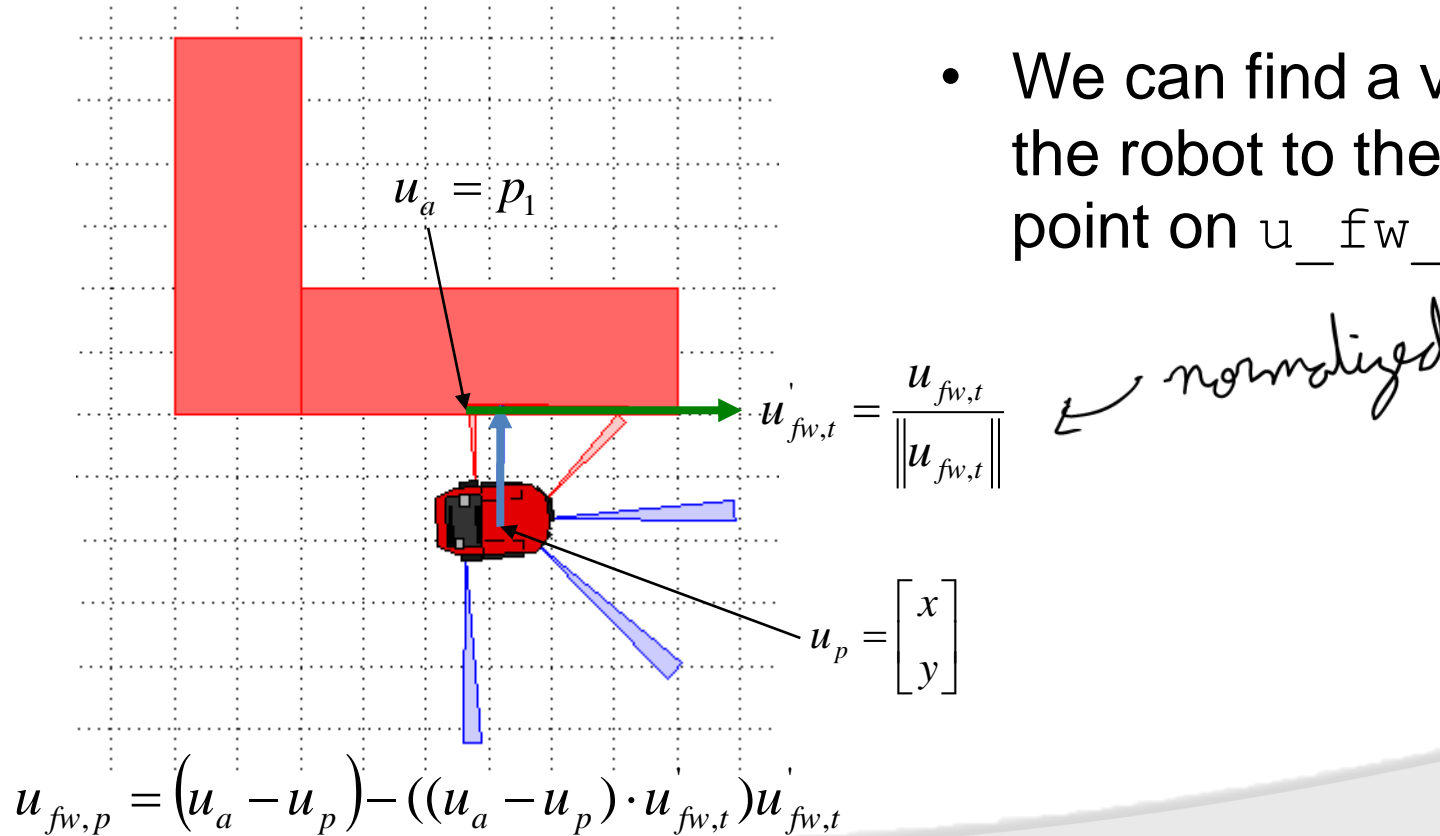
Estimating the Wall

- To follow wall on the *left*, use two (of three) left IR sensors with shortest distance measured.

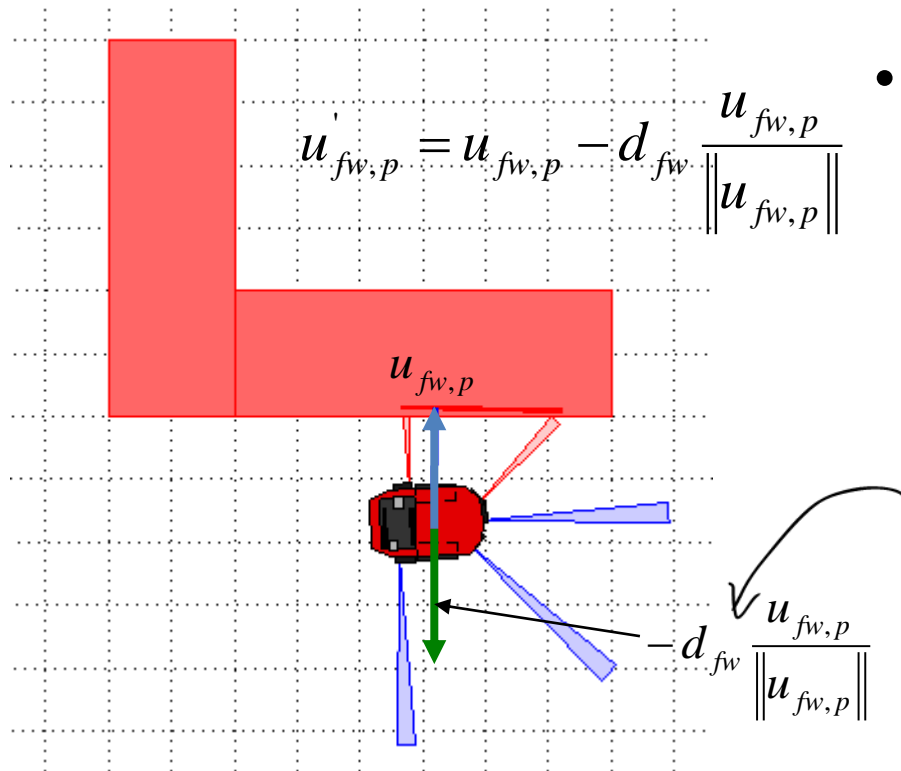


Maintaining Spacing from the Wall

- We can find a vector from the robot to the closest point on $u_{fw,tp}$.



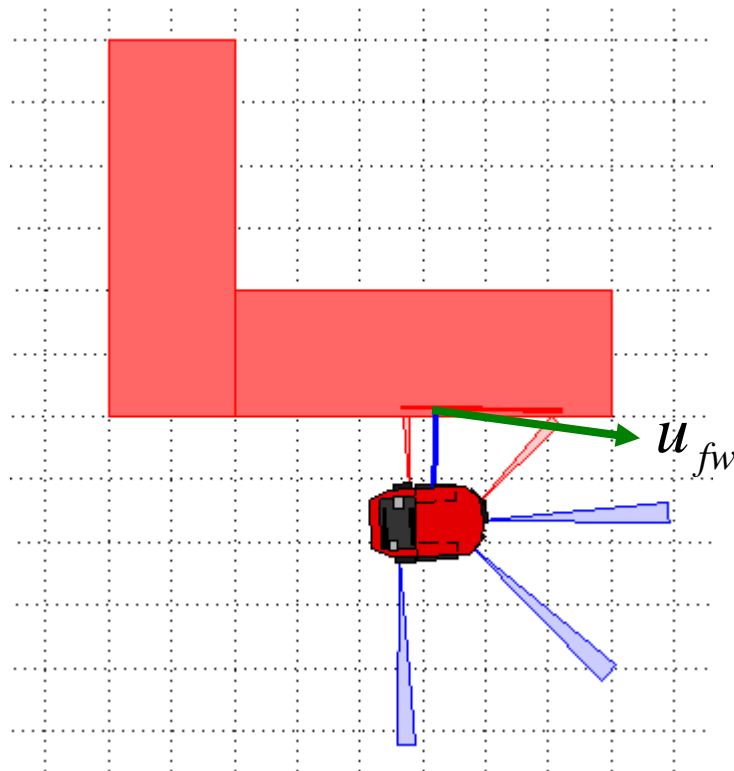
Maintaining Spacing from the Wall



- Find a vector that points in the opposite direction of $u_{fw,p}$ and weighed by the distance we want to maintain from the wall.

distance between robot and walls

Combining Vectors



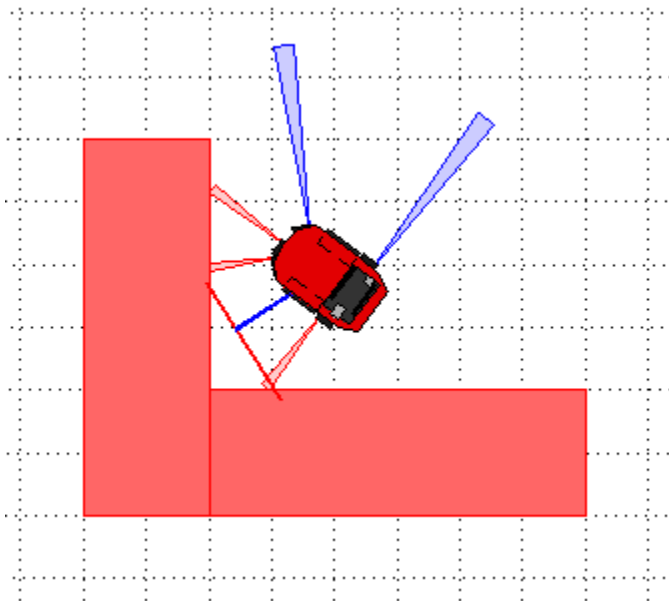
- Sum the two vectors into a single vector.

$$u_{fw} = \alpha u'_{fw,t} + \beta u'_{fw,p}$$

- Steer robot to orientation of u_{fw} .

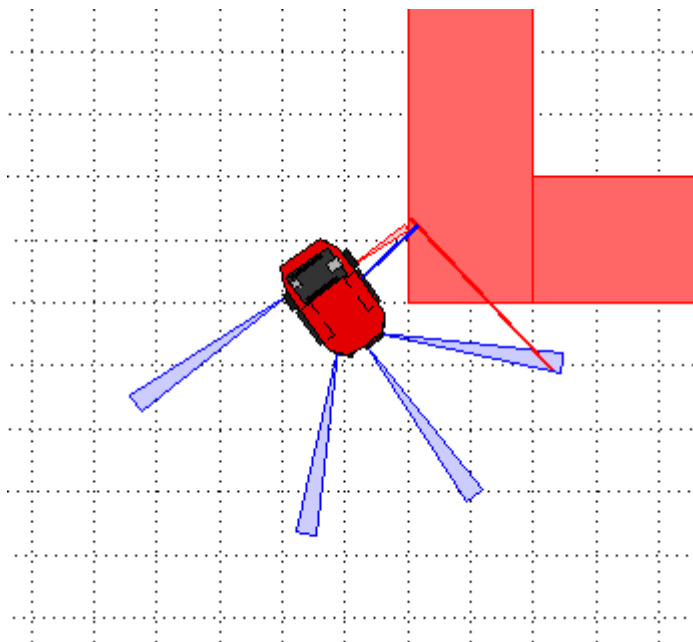
How well does this work?

- Not the best estimate on inside corners, but OK.



How well does this work?

- Outside corners are more problematic. We need a good d_{fw} .



Implementation

- Implement the missing logic and math in the following file:

`+simiam/+controller/FollowWall.m`

- Controller accepts 'left' and 'right' as input denoting the side of the robot on which to follow the wall.

Tips

- Refer to the section for Week 6 in the manual for more details!
- Experiment with different d_{fw} and combinations of the vectors u_{fw_t} and u_{fw_p} .