Go-To-Goal

Control of Mobile Robots: Programming & Simulation Week 3

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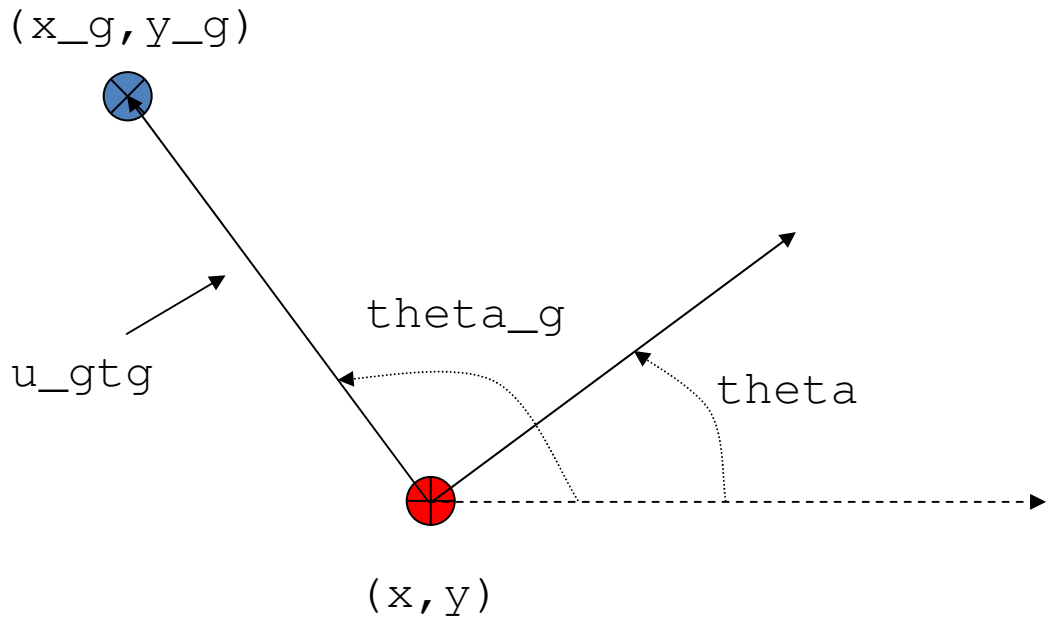
Overview

- The purpose of this week's programming assignment is to implement a go-to-goal PID controller.
  1. Implement the proportional, integral, and derivative terms of the controller.
  2. Adjust the gains for performance.

Notation



Go-To-Goal

- Keep v constant and use the PID controller to compute ω that steers the robot towards the goal.

+simiam/+controller/GoToGoal.m

```
classdef GoToGoal < simiam.controller.Controller
%% GOTOGOAL steers the robot towards a goal with a
% constant velocity using PID
```

Memory

- We need to keep track of the previous and accumulated error for the derivative and integral terms.

+simiam/+controller/GoToGoal.m

```
function obj = GoToGoal()
%% GOTOGOAL Constructor
    obj = obj@simiam.controller.Controller('go_to_goal');

     % initialize memory banks
     obj.Kp = 10;
     obj.Ki = 0;
     obj.Kd = 0;

     % errors
     obj.E_k = 0;
     obj.e_k_1 = 0;
```

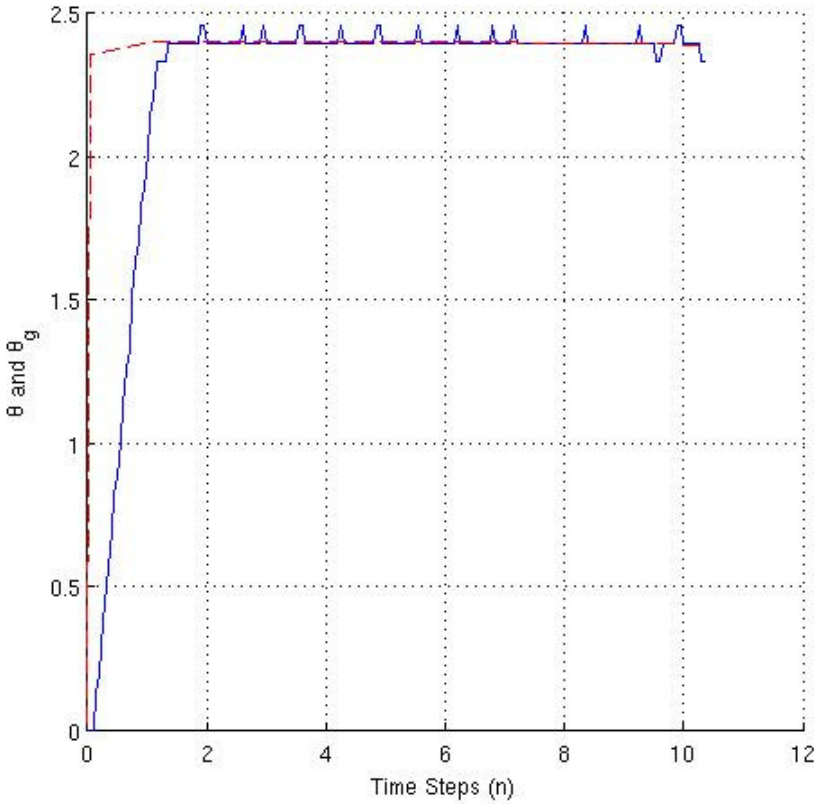
PID

- Implement all three parts of the PID controller in the `execute` function.

+simiam/+controller/GoToGoal.m

```
function outputs = execute(obj, robot, state_estimate, inputs, dt)
%% EXECUTE Computes the left and right wheel speeds for go-to-goal.
%   [v, w] = execute(obj, robot, x_g, y_g, v) will compute the
%   necessary linear and angular speeds that will steer the robot
%   to the goal location (x_g, y_g) with a constant linear velocity
%   of v.
```

Output



- PID controller should ensure that the difference between `theta` and `theta_g` is minimized.
- Little overshoot and no oscillations are desirable.

Testing

- We have included a stop condition in the supervisor, which ensures that the robot will stop near the goal location.

+simiam/+controller/+quickbot/QBSupervisor.m

```
function obj = QBSupervisor()
   %% SUPERVISOR Constructor
   obj = obj@simiam.controller.Supervisor();
   [ … ]
   obj.v = 0.1;
   obj.goal = [-1,1];
```

Tips

- Refer to the section for Week 3 in the manual for more details!
- Use the commented out fprintf statements or add your own for debugging.