Table of Contents

Test Nonholonomic Vehicle class

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```
clear all; fclose all; clc
```

Example 1: Create robot & let it drive

```
dt = .1; % timestep
x0 = 2;
y0 = 3;
th0 = pi/4;
vl = .2;
vr = .5;
robot = NonholonomicVehicle(dt,x0,y0,th0,vl,vr);

figure(1); clf
for i=0:9
    plot(robot.X,robot.Y,'ko','markersize',20); hold on;
    text(robot.X,robot.Y,num2str(i));
    robot.timestep();
end

axis square
title('Roomba position at each timestep')
drawnow
```

Roomba position at each timestep
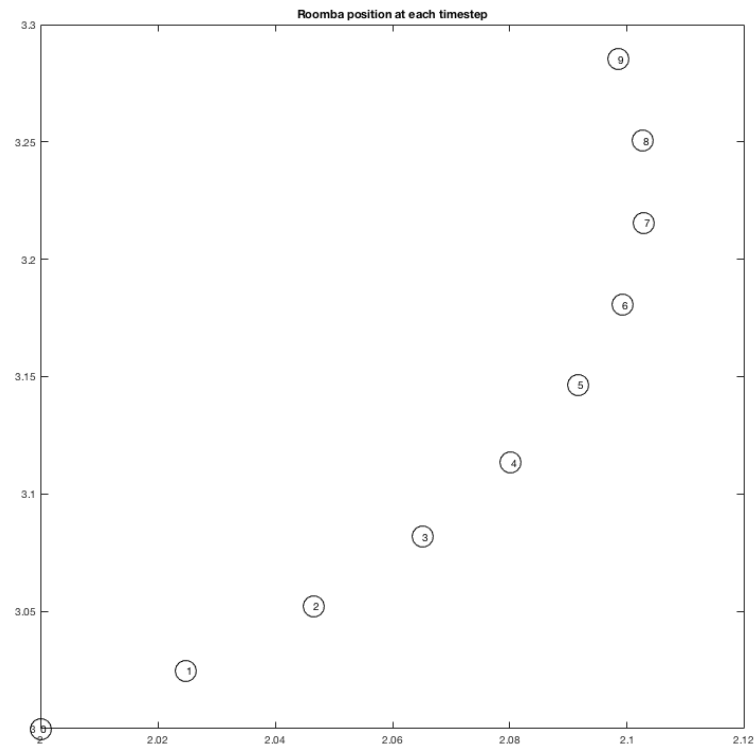
Example 2: Circle-tracing controller

Controller: A line-detecting sensor says whether the line is to the right (0) or left (1) of the robot. The controller adjusts the wheel velocities a litle in response to this, in order to turn the robot a little.

```matlab
figure(1); clf;
DIAM = 4;
rectangle('Position',DIAM*[-1/2,-1/2,1,1],'Curvature',[1 1]); hold on;

dt = .1;
x0 = DIAM/2 - .1;
y0 = 0;
th0 = pi/2;
vl = .4;
vr = .4;
robot = NonholonomicVehicle(dt,x0,y0,th0,vl,vr);

sensor = @(x,y) double(hypot(x,y) > DIAM/2);

TMAX = 13; % sec, len of sim.
n_iters = TMAX / dt;
xs = zeros(n_iters,1);
ys = zeros(size(xs));

for i=1:n_iters
```

```
        xs(i) = robot.X;
        ys(i) = robot.Y;

        robot.timestep();  % run dynamics
        s = sensor(robot.X,robot.Y);  % sense

        % Control:
        Vnom = .3;
        if s==0 % line is to the right; need to turn right a bit
            Vdiff = -.1;
        else
            % line is to the left; need to turn left a little
            Vdiff = .1;
        end
        robot.setWheelVelocities(Vnom-Vdiff,Vnom+Vdiff);

end

plot(xs,ys,'.'); hold on;
text(xs(1),ys(1),'START','color','r')
text(xs(end),ys(end),['END (t=' num2str(TMAX) ')'],'color','g')
axis square
axis(DIAM/2*1.1*[-1,1,-1,1])
title('Robot trying to follow a circle.')
```
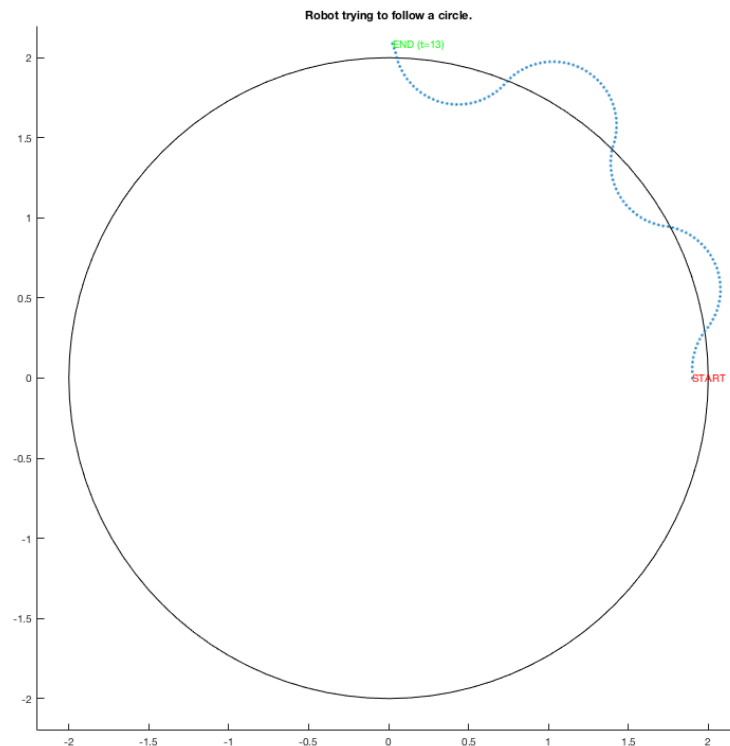

Robot trying to follow a circle.