ASSIGNMENT 4 – SC 627

Robotic Networks in Balancing

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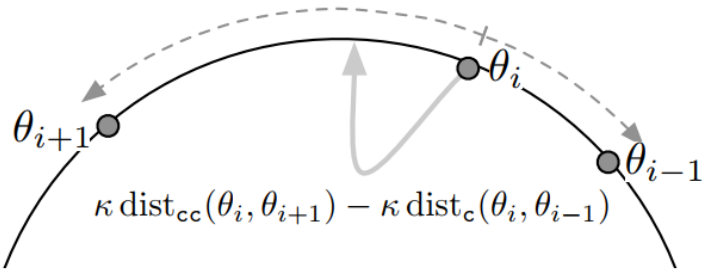
Theory



$$dist_c(theta_i(k), \theta_{i1}(k)) = dist_{cc}(\theta i1(k), \theta_i(k))$$
$$u_{balancing,i}(k) = \kappa dist_{cc}(\theta_i(k), \theta_{i+1}(k))\kappa dist_c(\theta_i(k), \theta_{i1}(k))$$

Fig 1 Robotic network balancing (SC627 notes)

In main code of robotic network balancing, balance of the robot is taken proportional to its distance between neighbor robot. Finally, bug will achieve equally spaced configuration between left and right fixed robot.

Given data

- Number of Robots N - 8
- Fixed Left Robot Position R_1 = (0, 0)
- Fixed Right Robot Position R_8 = (14, 0)
- Magnitude of Maximum Robot Velocity V_{max} = 0.15m/s

Other robots' positions were chosen randomly for testing the code as shown in the figure 2.

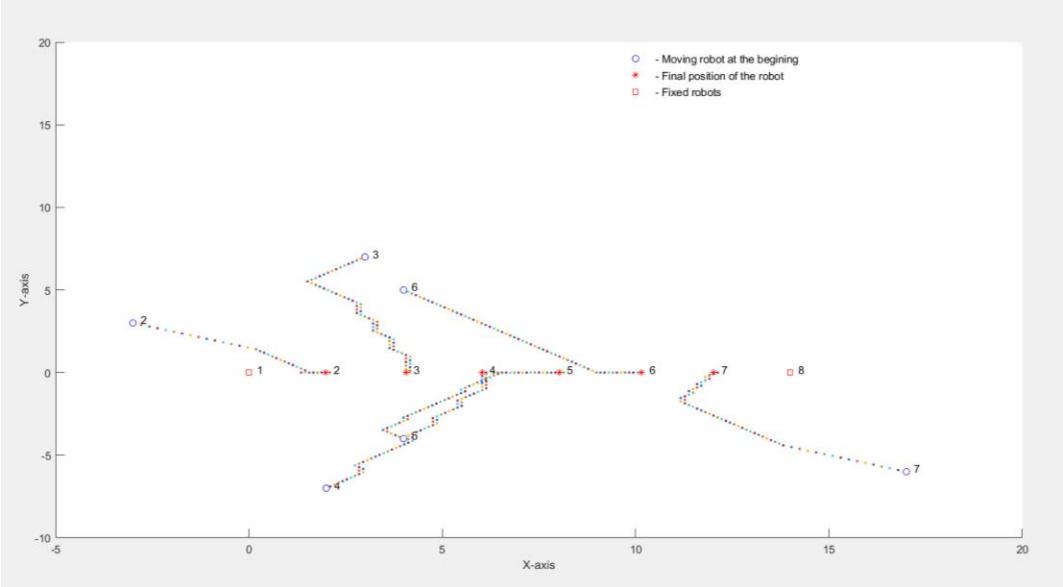


Fig 2 Robot movement while network balancing

Code for each robots x coordinates vs time plot

```
function plot_xvst(A,j)
% A -is the table which contains x coordinate in given time
% j -is the robot number

plot(A(:,2,j),A(:,1,j))

xlabel('x coordinates')
ylabel('time')
```

- Code file name : plot_xvst.m
- Function call : plot_xvst(A,2) for 2nd robot vice versa

X coordinate for each robot with time plot is attached as MATLAB figure(robot_2)