ME-GY 7943
Network Robotics Systems, Cooperative Control and Swarming

KAMAL PATEL

Exercise 1

a) The vector for desired constraints is shown below.

$$\begin{Vmatrix} (P1 - P4)^2 \\ (P1 - P5)^2 \\ (P4 - P5)^2 \\ (P2 - P5)^2 \\ (P3 - P4)^2 \\ (P2 - P3)^2 \end{Vmatrix}$$

b) The is shown in file Exercise1.py in folder **Exercise1**. The function definition name is constraints() in the code.

c) The is shown in file Exercise1.py in folder **Exercise1**. The function definition name is r_matrix() in the code. It finds the rigidity matrix of the graph.

d) The whole formation code is show in Exercise1.py. Below are shown the x and y position of all robots as function of time and also the formation graph.

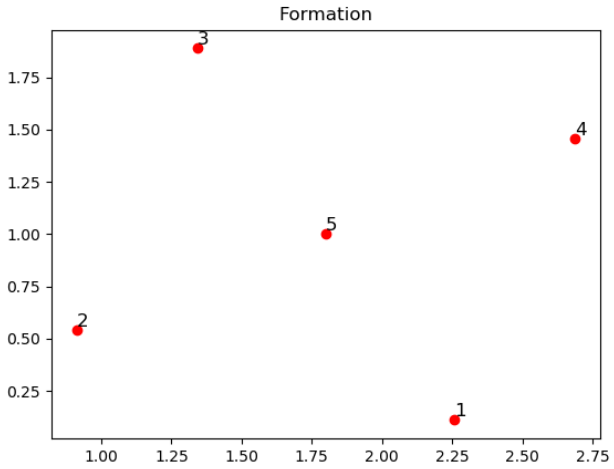

Fig 1. Formation

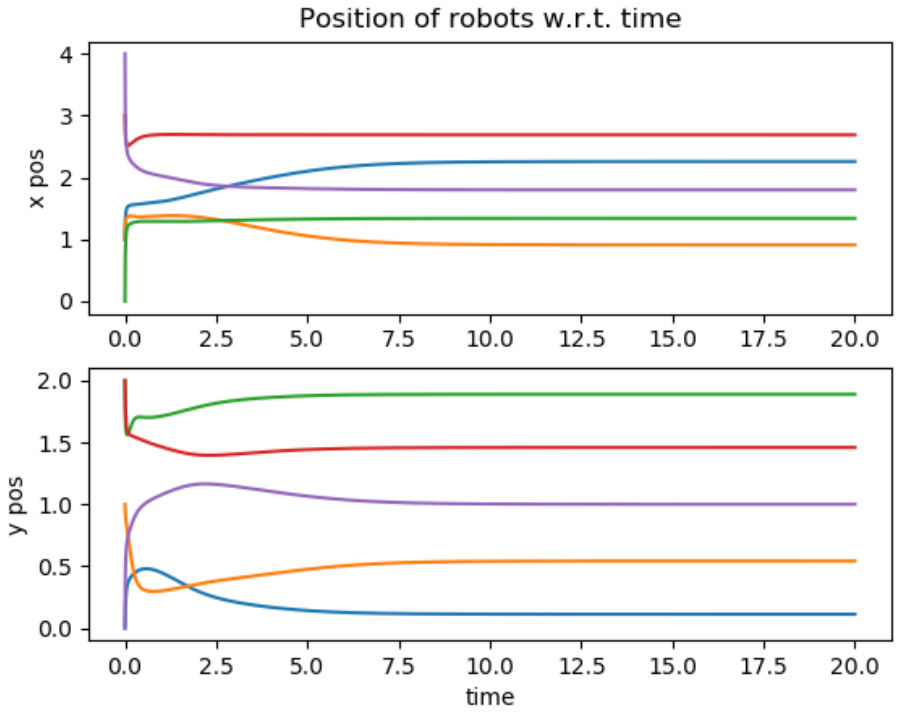

Fig 2. x and y position

Exercise 2

a)

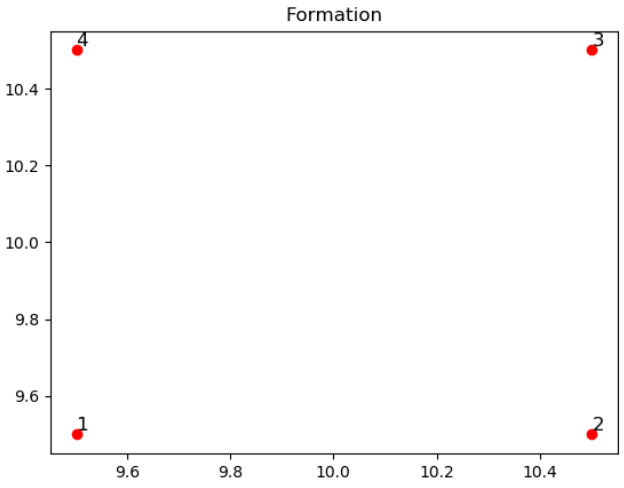

Fig 3. Square Formation

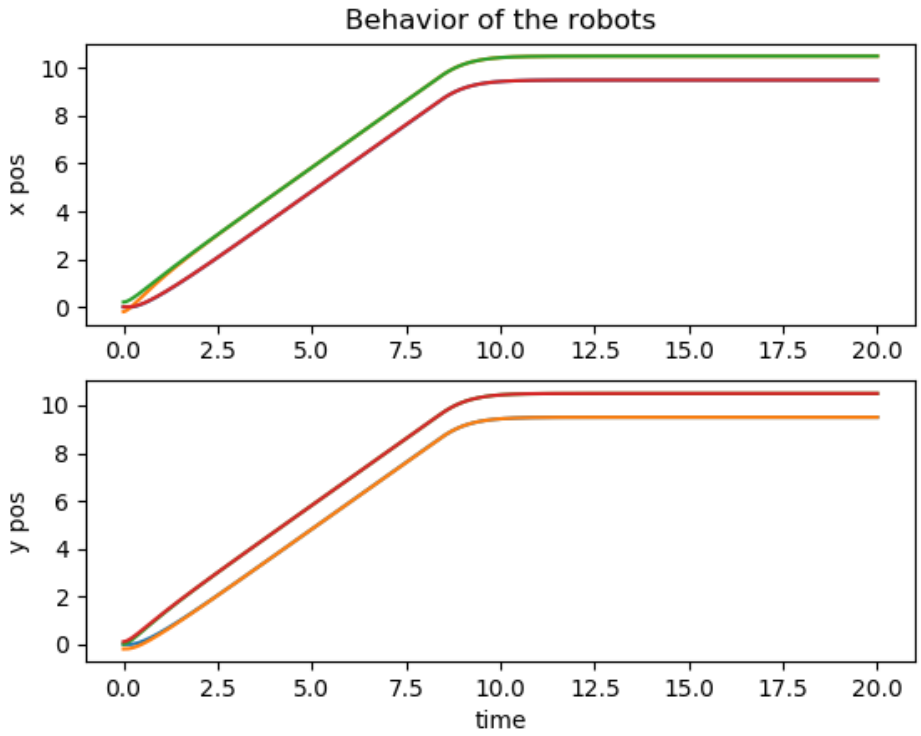

Fig 4. Behavior of the Robots with no obstacles

b)

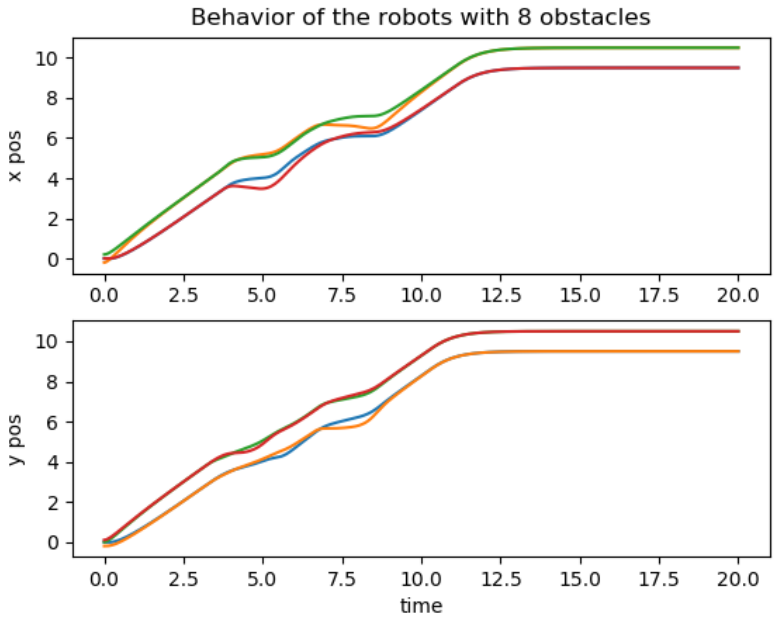

Fig 5. Behavior of robots with 8 obstacles

c) Yes the robots maintains the formation and reaches the target. Below is the behavior of the robots with 9 obstacles.

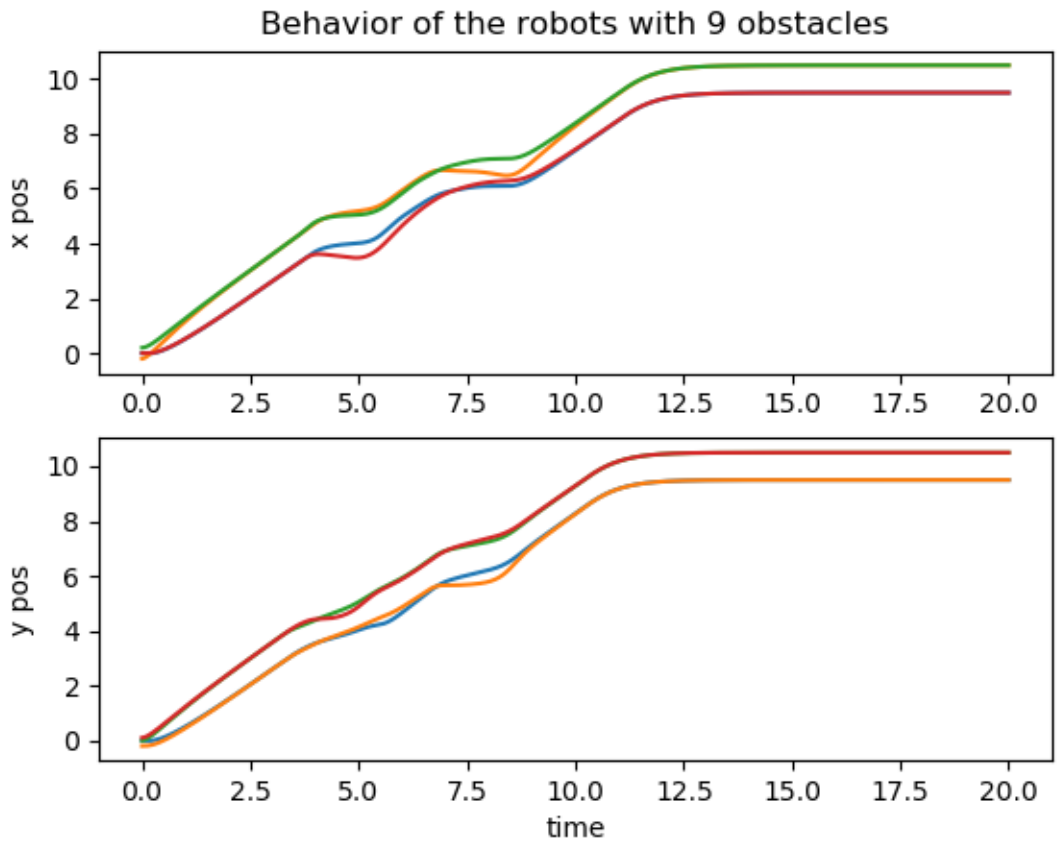

Fig 6. Behavior of the robots with 9 obstacles