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Multirobot Systems

The consensus problem and applications

Exercise 1: consensus

Master Program in Robotics, Graphics and Computer Vision
Departamento de Informática e Ingeniería de Sistemas
Universidad de Zaragoza

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Universidad Zaragoza

Exercise 1: consensus

- Make a local copy of the file in the following link:

  https://colab.research.google.com/drive/1j-X5cw9ibgxE8wPv_VeGOsWrtTr44coX?usp=sharing

- You will find code (some parts must be completed) to simulate a consensus protocol, here applied to a planar Rendezvous application.

- Complete and test your first version. Then, experiment with the different modifications of the problem proposed next

- **Keep copies of all the versions**! All versions of this Exercise must be submitted via moodle before the deadline for the exercises and Lab associated to this Part.

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Exercise 1: consensus

Make the appropriate modifications and tests to answer to the following questions:

- What are the effects of changing parameter **alpha** in the Perron matrix? Do you observe any relation with any other parameter in the involved matrices?
- What are the effects of including several **additional links**? Do you observe any relation with the other parameters?
- What happens if the graph is **disconnected**? (robots are divided into two separated connected subgraphs) Does it make sense?
- What happens if one robot is **leade**r? (i.e., it does not take into account the information from the neighbors, but it keeps its state unchanged instead)
- And it three of the robots are leaders instead? What is the **name** of this problem?
- In a gossip scheme, at every iteration, one link is randomly selected. Then, the two involved robots i, j, instead of using the consensus rule, update their states with **(xi + xj)/2** . Does this algorithm converge? Is the graph “connected” in this case?

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