

SC 627 Assignment 4 - Report

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Algorithm for convergence:

The “balancing” subroutine/method defined in the class “balance” takes care to command a velocity vector (V_{xi} , V_{yi}) for every moving robot R_i such that the robots are balanced (equidistant from each other).

This is done by implementing a proportional control strategy for each robot wherein the commanded velocity (for the next instant) is directly proportional to the difference between the current x-position of the robot and the x-coordinate of the midpoint of the line segment joining the left and right robots. Due to this, each robot tries to attain the position which is the midpoint of its left and right robots.

The condition used for terminating the while loop, i.e, the condition of attaining balance, is that the velocity of the current robot, its right neighbor and its left neighbor should go to zero theoretically. But for implementation the threshold is set to 0.0002.

The robot velocity commanded by the control strategy is given by,

$$V_{xi} = -k_p * [x_i - ((x_{i-1} + x_{i+1})/2)]$$

Data structures:

The data structures used in this assignment are:

1. Class: It is used for storing various robot variables and control functions.
2. Lists: It is used for storing time and the x and y coordinates of each robot.