Guidelines for Student Reports

Implementation of an algorithm to permit the robot to avoid obstacle found on his path

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Abstract

Eledia Research Center has developed a Robot Swarm to monitoring a parameter in a research area. Furthermore the Swarm are able to identify the location of the maximum of the monitored parameter.
The swarm is formed by four robot, everyone composed by:
- a WSN node that control every device,
- a robotic kit to permit movement,
- infrared and compass sensor to know his position,
- a brightness sensor to monitor the light parameter.

The movement of the robot are controlled and coordinated by PSO algorithm, a stochastic and multiple agent optimization algorithm that follow the logic of how a swarm of bee reach the area where there is more honey in a grass. Every robot, at every iteration of the algorithm, know his best position (pbest) and the best position of all the swarm (gbest), following the PSO algorithm calculate his movement to reach the area where the brightness reach his maximum value.
In this system at every iteration of the PSO algorithm, every robot make a movement from his current position to the next one calculated by the PSO.
The movement of every robot is divided in two steps:
1 - make a rotation in order to direct the robot in the direction of the next position;
2 - go straight on to reach the next position.
If between the robot and his next position is present an obstacle, now the robot see the obstacle with his Infrared Sensor, and stop his movement before the collision with the obstacle.
The goal of this project is to implement an algorithm that permit to the robot to avoid the obstacle and reach his next position.

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