

Hybrid Gravity Gradient Inversion-Ant Colony Optimization Algorithm for Motion Planning of Mobile Robots

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Abstract : Motion planning is a common task required to be fulfilled by robots. A strategy combining Ant Colony Optimization (ACO) and gravity gradient inversion algorithm is proposed for motion planning of mobile robots. In this paper, in order to realize optimal motion planning strategy, the cost function in ACO is designed based on gravity gradient inversion algorithm. The obstacles around mobile robot can cause gravity gradient anomalies; the gradiometer is installed on the mobile robot to detect the gravity gradient anomalies. After obtaining the anomalies, gravity gradient inversion algorithm is employed to calculate relative distance and orientation between mobile robot and obstacles. The relative distance and orientation deduced from gravity gradient inversion algorithm is employed as cost function in ACO algorithm to realize motion planning. The proposed strategy is validated by the simulation and experiment results.

Keywords : motion planning, gravity gradient inversion algorithm, ant colony optimization

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