

Hybrid path planning for indoor robot with Laplacian Behaviour-based control via four point-explicit group

Abstract

In this paper, a robust searching algorithm to generate path planning for mobile robot is proposed. It is inspired by the behaviour-based paradigm approach to robotics architecture, in which the searching algorithm employs Laplacian Behaviour-Based Control (LBBC) during space exploration of the environment. The LBBC make use of the potential functions in the configuration space model to guide its exploration. Laplace's equation was used to represent the potential functions in the configuration space of the robot. Consequently, the gradient of the potential functions would be used by the searching algorithm to generate path from starting to goal location. In a difficult environment, however, it suffers from the occurrence of flat region with no appreciable gradient, which result in the difficulty for the searching algorithm to generate path. The LBBC would enable the searching algorithm to generate path successfully even with the occurrence of this flat region. In this paper, the solution to Laplace's equation is calculated via Four Point-Explicit Group (4EG) iterative method for rapid computation compared to the traditional point Gauss-Seidel iteration.