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Contents

Analysis of Mobile Robot Path Planning with Artificial Potential Fields

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Abstract. This paper presents an analysis of a mobile robot path planning using potential field technique. The mobile robot has four wheels which can all be driven and steered independently. For simplicity, this paper assumes Ackermann steering such that the vehicle can be approximated as a two-wheel system (commonly known as a bicycle model) for path planning purposes. The potential field method that emphasizes on attractive potential field and repulsive potential field are proposed for analysis in this paper for path planning. The control gains which represents the attractive and repulsive force are studied to determine the effectiveness of the proposed method. Based on the simulation results, the robot able to avoid obstacle and at the same time arrived at the goal. The robot priorly do not pose any information on the environment and then moves until it reach its goal. Different cases of the potential fields and landmarks positions are also presented to determine the robot performance.

Keywords: Mobile robot, Path Planning, Potential Field.

1   Introduction

A mobile robot is a robot with a capability to move around and interact with its surroundings. There has been a comprehensive investigation into mobile robotics as almost every major engineering in a university has one or more labs that focus on mobile robot research. Adding to this scenario, many system such as in industrial application, army and security system have been applied the mobile robot as an alternative solution for various conditions. Based on the Japanese Industrial Robot Association (JIRA) [1], robots can be divided into several classes which explain its function and to a certain extent, its level of complexity.

Mobile robot navigation is an important aspect of mobile robotics system design since its functionality is greatly depends on "mobility" features. As the utilization of robot are extended to industrial applications, the robot must has an efficient and intelligent technique to pursue its objectives. Engineers, researchers and technologist are consistently explores the potential of robots in helping and managing daily chores such as house cleaning, babysitting, tour lead, shopping attendant, and many other applica-