بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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Ain Shams University

Faculty of Engineering

Mechatronics Department

Local Path planning for an Autonomous Vehicle in a Non-Deterministic Environment

A Thesis submitted in partial fulfillment of the requirements of the degree of Master of Science in Mechanical Engineering (Mechatronics Engineering)

By

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Bachelor of Science In Mechanical Engineering

(Mechatronics Engineering)

Faculty of Engineering, Ain Shams University, 2013

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Statement

This thesis is submitted as a partial fulfilment of Master of Science in Mechanical Engineering (Mechatronics Engineering), Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Abstract

One of the biggest problems that face the production of an autonomous vehicle is finding a clear path where the vehicle steers away from static and moving obstacles to prevent any possible accidents, and yet continues moving toward the required destination to fulfill its goal of reaching a desired location. This thesis focuses on the problem of finding a feasible trajectory and a collision-free path for an autonomous vehicle with the presence of many moving obstacles in the environment. We approach this issue by using an analytical method where we consider the kinematic model of the car and the surrounding environment to develop a feasible trajectory with the corresponding steering control and the collision avoidance conditions. The collision-free path generated can be updated in real time once the environment is changed and detected by the car. Matlab simulation is used to provide the results for the analytical method used where obstacles were sometimes fed into the simulation and sometimes randomly generated. Also, an intersection crossing scenarios were simulated to show the ability of the analytical method to be used in a more constrained environment.

The analytical method applied was successful to generate a collision-free path in the simulation scenarios. It enabled the car to navigate the environment and reach the designated end point without collisions.

Keywords: Autonomous Vehicle, Local Path Planning, Trajectory Planning, Motion Planning, Collision Avoidance, Analytical Method, MATLAB.

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