Studying and analysis of path following algorithms for robots and its correction for obstacle avoidance[*]

Eng. Nabila Al Allan[**]   **Dr. Rezq Ghanem**[***]

Abstract

In this research a review of methods needed to make a vehicle follow a predefined path has been done where the vehicle can follow the path and return to it if any deviation happened. The following Algorithms have been applied to follow the path:

1- Follow The Carrot [1] Algorithm

2- Pure Pursuit [2] Algorithm

3- Follow The Past [3] Algorithm

The implementation of these algorithms has been done by using statistical analysis software (MATLAB) to make a robotic vehicle movement simulator that uses algorithms to follow a predefined path (recorded path).

We have found as a result that the (Follow the Carrot) algorithm is simple for understanding and applying, on the other hand it causes larger errors in position and larger deviation from the path.

Also in the (Follow the Carrot) algorithm, the vehicle tends to take short cuts and moves directly towards the goal point instead of moving on path curves.

Pure Pursuit algorithm also suffers from the same problems, but not in the same critical way, where we can get better proportion results .Whereas the (Follow the Past) algorithm achieves a perfect path tracking for applying certain conditions and study parameters.

Keywords: Path Following, Follow the Carrot, Pure Pusuit, Follow The Past, Autonomous robot.

.

Reference

[1] MATTHEW J.BARTON. Controller Development and Implementation for Path Planning and Following in an Autonomous Urban Vehicle. Undergraduate thesis, University of Sydney, November 2001.

[2] R.CRAIG COULTER. Implementation of the Pure Pursuit Path Tracking Algorithms. Technical Report CMU-RI-TR-92-01, Robotic Institute, Carnegie Mellon University, Pittsburgh، PA, January 1992.

[3] THOMAS HELLSTROM, OLA RINGDAHL. Follow the Past- a Path Tracking Algorithm for Autonomous Forest Vehicle. SE-901 87, University of Ume، Sweden, April 2004.

[4] THOMAS HELLSTROM. Autonomous Navigation for Forest Machines. Pre-study, University of Umea, Aug 2002.