Abstract

This paper deals with the intelligent navigation control of Intelligent Autonomous Vehicles (IAV) in an unknown environments. The aim of this paper is to develop an IAV combining Expert Systems (ES) and Fuzzy Logic (FL) for the IAV stationary obstacle avoidance to provide them more autonomy and more intelligence. Artificial intelligence, including Fuzzy logic and Expert system, has been actively studied and applied to domains such as automatically control of complex systems like robot. The proposed approach can deal a wide number of environments. This system constitutes the knowledge bases of FL_ES approach allowing recognizing situation of the target localization and obstacle avoidance, respectively. The integration of FL and ES based on intelligent computing offers to the autonomous mobile system the ability to realize these factors: recognition, learning, decision-making, and action (the principle obstacle avoidance problems). Hence, this hybrid intelligent system FL_ES is necessary to bring the behaviour of Intelligent Autonomous Vehicles (IAV). The combination of FL and ES is done using a grid-map form of an unknown environment with static unknown obstacles. The proposed algorithm allows a mobile robot to navigate through static obstacles, and finding the path in order to reach the target without collision. In each situation and autonomously, the robot moves within the unknown environment by sensing and avoiding the obstacles coming across its way towards the target. This intelligent task must make the robot able to achieve these tasks: to avoid obstacles, and to make ones way toward its target by ES_FL system capturing the behavior of a human expert. The integration of ES and FL has proven to be a way to develop useful real-world applications, and hybrid systems involving robust adaptive control. The proposed approach has the advantage of being generic and can be changed at the user demand. The results are satisfactory to see the great number of environments treated. The results are satisfactory and promising for next development