

Development of a new minimum avoidance system for a behavior-based mobile robot

ABSTRACT

A new fuzzy logic algorithm is developed for mobile robot navigation in local environments. A Pioneer robot perceives its environment through an array of eight sonar sensors and self positioning-localization sensors. While the fuzzy logic body of the algorithm performs the main tasks of obstacle avoidance and target seeking, an actualóvirtual target switching strategy resolves the problem of limit cycles in any type of dead-ends encountered on the way to the target. This is an advantage beyond pure fuzzy logic approach and common virtual target techniques. In this work, multiple traps may have any shape or arrangement from barriers forming simple corners and U-shape dead-ends to loops, maze, snail shape, and other complicated shapes. Robot trajectories are demonstrated by simulation work and compared with results from other related methods to prove the robustness of this method.

Keyword: Fuzzy logic; Local navigation; Minimum avoidance; Virtual target; Autonomous robotics