

Title

A New Control Architecture in Mobile Robot Navigation Based on IT2Neuro-Fuzzy Controller

Abstract

Autonomous mobile robots navigating in changing and unknown environments need to cope with large amounts of uncertainties that are inherent in natural environments. Most of the controllers have some common drawbacks such as, large computation, expensive equipment, hard implementation, and the complexity of the system. In this paper, novel controller architecture is introduced based on interval type-2 fuzzy logic controller (IT2FLC) and weightless neural network (WNNs) classifier named interval type-2 neuro-fuzzy controller (IT2NFC) that is embedded on mobile robot. The proposed control architecture can be implemented easily with low cost range sensor and low cost microprocessor. The work presented deals with a WNNs is used to make environmental recognition and IT2FLC to make navigation decisions. Various experiments is performed use IT2NFC compared to logic function, type-1 fuzzy logic controller (T1FLC) and type-1 neuro-fuzzy controller (T1NFC). The result shows that IT2NFC achieved good performance that has outperformed its type-1 counterpart in terms of reliability and obstacle collisions in several environment conditions.

Keywords: *Mobile robot, Architecture, Neuro-fuzzy, Navigation*