Design and Implementation of Multiple-level MIMO Fuzzy Logic Controller for a Multi-Robot Platform

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Abstract

Fuzzy Logic is a many valued logic and it is very similar to human reasoning which is not binary. It uses approximate measures rather than exact, making it suitable for linguistic based analysis. In this paper, the authors develop a pure fuzzy logic-based controller for a dynamic robot platform with multiple robots and multiple identity assignment. Several fuzzy logic blocks are used as a function in the program, which are used in different parallel and series configurations. One of the functions is a multiple input-multiple output (MIMO) fuzzy logic design. The implementation is in a 3-on-3 Soccer Robot platform. The proposed strategy provides role assignment; Forward, Back and Goal-keeper. The robot identity assignment depends on the position of each robot with respect to the position of the ball. Although tuning procedures are rigorous, the linguistic approach and human reasoning nature of fuzzy logic made it easy for the developers to achieve its completion. Overall, the proposed artificial intelligence produced favorable response based on the expected outcome and experimentations.