Abstract

The paper describes a new proposed algorithm to automatically tune a Fuzzy Logic Controller by using motor Speed profile and Genetic Algorithm (FLCSGA algorithm) in controlling a DC Servo Motor. In the new method, the tuning process of the Fuzzy Logic Controller (FLC) is divided into two consecutive stages which are tuning rule base and tuning Membership Functions (MFs). The tuning rule base (Fuzzy rules) is based on the motor speed profiles, and the Genetic Algorithm (GA) is used to optimize MFs. In addition, a new encoding method was suggested for the GA that reduces remarkably optimization time for the system. This is a very important thing, especially with the real experiments for optimizing system such as motors control. The experiments on a Maxon motor RE 35 273752 showed that after using FLCSGA algorithm, an optimized FLC was generated. This FLC that had better performances compared to using the conventional proportional-integral-derivative controller (PID controller) in term of settling time, rise time. Besides, the required generations and the amount of chromosomes in population of GA are reduced significantly compared to some previous studies. It means the convergence time is very fast.
Using Motor Speed Profile and Genetic Algorithm to Optimize the Fuzzy Logic Controller for Controlling DC Servomotor


Index Terms

Computer Science

Algorithms

Keywords