

Artificial Intelligence Control of Electric Motor Drive Systems

Date/Time: Tuesday, December 11, 2007, 1:00-2:00pm
Place: SL 165 (723 West Michigan Street)
Speaker: Dr. Marcel Castro-Sitiriche, Adjunct Faculty, Howard University

ABSTRACT

Neuroscience and genetics have provided a rich source of research ideas for engineering. At present time, genetic algorithms, artificial neural networks and fuzzy logic methods have been proved to be useful in a number of control applications. Different approaches to motor drive controls using artificial intelligence will be discussed. Real-time implementation of the proposed controllers is crucial in the evolution of a designed controller into the actual implementation of a control application. Laboratory experiments results show the applicability of such methods in step motor drives and brushless DC (BLDC) drives. Two distinct multilayer neural networks are implemented via laboratory experiment to simultaneously identify and adaptively control the trajectory tracking of a hybrid step motor. The neural network controller is constructed as a nonlinear unknown function depending on the current state of the drive system supplied by the neural network identifier and the reference trajectory. Moreover, a real-time implementation of hybrid fuzzy-PID controller is demonstrated in a laboratory 1-hp BLDC motor drive system. Both the design of fuzzy-PID controller and its integration with the conventional PID in global control system to produce a hybrid design are established. A genetic optimization technique is used to determine the optimal values of the scaling factors of the output variables of the fuzzy-PID controller.

BIOGRAPHICAL SUMMARY

Marcel J. Castro-Sitiriche was born in Santurce, Puerto Rico. He received the B.Sc. degree in electrical engineering from University of Puerto Rico, Mayagüez in 2000 and the PhD degree in electrical engineering from Howard University, Washington, DC, in 2007. In the same year, he joined Howard University, Washington, D.C., as a faculty member in the Electrical and Computer Engineering Department. His current research interests are in the areas of artificial intelligence, electric motor drives, control systems, neuroscience, appropriate technology and engineering education.

***** **Refreshments will be served at 12:30pm** *****