

ALI Hussain Majeed . Fault Detection and Isolation Sensor Based on Artificial Intelligent Using Particle Swarm Optimization. UNIVERSITY OF TECHNOLOGY.

Department of Electrical Engineering .M.Sc. Supervisor by Dr. Abbas H. Issa.2012. 81p.

Abstract

Efficient methods for Fault Detection and Isolation (FDI) have been developed for any type of sensor. These methods are based on soft computing techniques; Neural Network (NN), and Adaptive Neuro Fuzzy Inference System (ANFIS). The proposed methodology for intelligent fault detection in sensor is based on using particle swarm optimization (PSO) algorithm to improve the ability of soft computing model to detect any type of faults by reduce the mean square error (MSE) for modelling the sensor.

In this work, a sensor fault detection using artificial neural networks trained by particle swarm optimization is presented, where the adaption of the ANN weights using PSO is proposed as a mechanism to improve the performance of the ANN. Each particle in the swarm has been proposed as a set of weights needed for training each NN to obtain the same target results and obtain zero error value. For this purpose, MATLAB PSO toolbox is modified to be suitable for the taken application .

The proposed two models have been used in FDI system for faults detection and check the system with the proposed general three types of faults (abrupt, incipient and intermittent) for the sensor. The temperature sensor (TMP36) has been used in this work as a linear sensor and distance sensor (GP2D12) as a nonlinear sensor.

Fault isolation is the second essential part of FDI system to identify the type of fault which detected in the first part of the system.

Keywords: Sensor fault detection and isolation (FDI), ANFIS, PSO, NN, temperature sensor, distance sensor.