University of Huddersfield Repository

Ashari, Djoni, Pislaru, Crinela, Ball, Andrew and Gu, Fengshou

Artificial intelligence-based condition monitoring for practical electrical drives

Original Citation


This version is available at http://eprints.hud.ac.uk/id/eprint/13475/

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

http://eprints.hud.ac.uk/
Artificial Intelligence-Based Condition Monitoring for Practical Electrical Drives

Djoni Ashari, 1st year PhD Student
Supervisors: Dr. Crinela Pislaru, Prof. Andrew Ball, Dr. Fengshou Gu
Diagnostic Engineering Research Centre
Computing and Engineering

Experimental Test Rig

1. Motor Current Signature Analysis (MCSA)
2. Induction machine condition monitoring using notch-filtered motor current
3. Parameter estimation using Genetic Algorithm (GA)
4. Instantaneous Angular Speed (IAS)
   - Band-pass filtering
   - Analytic representation (Hilbert transform)
   - Carrier frequency removal (frequency shifting)
   - Angle calculation and differentiation

SOMA Used for the Optimisation of Ambient Vibration Energy Harvesting

SOMA
- Self-Organizing Migrating Algorithm
- Optimisation using Artificial Intelligence

A_v Ambient Vibration
Mechanism
- Mechanical part (mass m, spring k, damper b_m)
- Electromagnetic Energy Converter (coils L and R_c)
- Electrical Load R_L

Optimisation can help in generating the maximum amount of electrical power

Next Steps
- Improve the quality factor of the model
- New harvester design for wireless application

Design of Expert System

Start

Problem Identification and Analysis

System Specification
Development Tool Selection

Knowledge Based:
- Knowledge Acquisition
- Knowledge Representation
- Computer Code

Prototype System
Testing and Validation
Implementation

Refinement
Stop