

**UNIVERSITI TEKNOLOGI MARA**

**A NEW ISLANDING DETECTION  
TECHNIQUE BASED ON PASSIVE  
PARAMETER USING ARTIFICIAL  
NEURAL NETWORK  
EVOLUTIONARY PROGRAMING**

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Thesis submitted in fulfillment  
of the requirements for the degree of  
**Master of Science**

**Faculty of Electrical Engineering**

**July 2019**

## ABSTRACT

One of the main requirements of distribution utility companies related to interconnection of distributed generation (DG) is islanding detection technique. Islanding occurs when part of the distribution system becomes electrically isolated from the main supply, and it remains energized by DG in an isolated subsystem. Failure to detect islanding may lead to power quality issues, equipment damage and safety issues concerning the electrical company workers. Therefore, DG connection codes worldwide require that all islanded DGs to be disconnected as fast as possible after the formation of islanding. Among islanding detection technique, computational intelligence technique is the most recent approach that can produce almost zero non-detection zone. The objective of this thesis is to design a new islanding detection technique for synchronous type of DG based on the most sensitive passive parameters by using Artificial Neural Network (ANN) Evolutionary Programming (EP). The most sensitive parameter is selected from the sixteen parameters designated for this study considering the sensitivity analysis. The analysis is produced based on the response of each parameter when the test system is subjected with different types of islanding and non-islanding event. The selected parameter is applied as an input for ANN-EP. EP is used to optimally tune the ANN parameter in order to classify accurately the islanding phenomenon. Large numbers of training and testing data set are recorded from simulation studies carried out on 11kV distribution test system. The simulation considers islanding and non- islanding events with different steps of power mismatch. Comparison performance of ANN and ANN-EP in classifying islanding and non-islanding event is performed. In addition, the analysis of k-fold cross-validation performance is done to ensure results obtained from ANN-EP are accurate. Results show that the ANN-EP outperform ANN in terms of accuracy of classification. This proves that the proposed islanding detection technique capable to distinguish islanding and non-islanding event correctly.

## ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful. Alhamdulillah, for His blessing and guidance during the preparation of this thesis.

First of all, I owe my deepest gratitude to my supervisor, Ir Dr Hasmainsi Binti Mohamad for his guidance, professional supervision and continuous motivation towards the completion of this research work and thesis. Thank you for your undivided trust in my capabilities, and providing me with all the support and flexibility which enabled me to finish my master even with the birth of my child during my studies.

A hearty thanks to my co-supervisor, Dr Nofri Yenita Binti Dahlan and all my colleagues for the constructive comments, supports and academic discussion during the period of this research.

My warmest thanks and love goes to my dearest husband, Syed Muhammad Haidel Bin Syed Yahaya and my lovely daughter, Sharifah Husna Binti Syed Muhammad Haidel for their continuous and unfailing love, support and understanding my persistence in the graduate career and makes the completion of this thesis possible.

I am also indebted to my beloved mother, \_\_\_\_\_ and my beloved father, Ab Salam Bin Yaacob, and all my family members as well as my in laws for their love, motivation, prayer and ceaseless support that have brought me to this level.

May my humble discoveries give some contributions in this enormous world of knowledge!

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