48550: Renewable Energy Systems

48550 Spr 2019 Tuesday 09:00

Group project 2019

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2019

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# **3. Tasks**

## **3.1. Literature Review**

### **3.1.a. MPPT Algorithm 1 (Genetic Algorithm)[1]**

**What particular issue of MPPT has this paper addressed?**

To use genetic optimal algorithm as an improved method for Maximum Power Point Tracking to obtain faster and more accurate results. The compromise between simplicity to implement for accuracy is also widely accepted amongst many with genetic algorithm.

**What is the algorithm of the proposed MPPT?**

Genetic Algorithm.

**How does this MPPT algorithm address the issue?**

Genetic Algorithm is high in accuracy, has good robustness which overcomes power attenuation in the tracking process

**What are the improvement shown from this MPPT?**

Has lesser difficulty in obtaining data in terms of speed and accuracy in comparison to P&O algorithms and has broader applications.

**Any potential issue(s) with this proposed MPPT?**

Neural Network algorithms do not work in continuous output systems. Energy is also lost as sampling is also involved. High memory space and high computing power is also required to execute the neural network algorithm for accuracy (little to no oscillation at the MPP) and strong anti-interference for the best results possible.

### **3.1.b. MPPT Algorithm 2 (Ripple Correlation)[2]**

**What particular issue of MPPT has this paper addressed?**

To provide a simpler, more optimal and accurate algorithm to track the MPPT within PV panels as P&O lacks speed and adaptability to track faster transients under varying environmental conditions. Because of these drawbacks, the overall performance of P&O algorithms; in terms of accuracy and speed, will degrade very quickly as more complications and factors come into play. The ripple correlation algorithm aims to rectify these issues.

**What is the algorithm of the proposed MPPT?**

Ripple Correlation

**How does this MPPT algorithm address the issue?**

Through extremely fast computations, highly accurate and simple implementations, it is a dynamic optimisation technique that uses ripples at any given instance in any switching power converters to drive a cost function to a local optimum.

**What are the improvement shown from this MPPT?**

Higher and more efficient performance for better readings and results. Since it is flexible to work under stricter and demanding conditions, it is also optimal to implement ripple correlation algorithms over P&O algorithms for power systems that are larger in scale and accuracy will not be compromised with time. It is also possible to change the output reference current to approach the maximum power operating point since it uses instances as the input variable.

**Any potential issue(s) with this proposed MPPT?**

In discrete Ripple Correlation, certain samples under strict conditions need to be sampled at precise times, otherwise, the complexity of solving the ripple in that specific time could become very complex if taken at other times.

### **3.1.c. MPPT Algorithm 3 ()[3]**

**What particular issue of MPPT has this paper addressed?**

**What is the algorithm of the proposed MPPT?**

**How does this MPPT algorithm address the issue?**

**What are the improvement shown from this MPPT?**

**Any potential issue(s) with this proposed MPPT?**

## **3.2. Design of an improved MPPT Algorithm**

### **3.2.a. Statement on the Design Chosen**

### **3.2.b. Flow Chart of the Proposed MPPT Algorithm**

# **3.3. Implementation and Testing of the Proposed MPPT Algorithm**

## **3.3.a. Results**

## **3.4. Conclude Design and Feedback**

# **References**

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| [1] | J. Long and Z. Chen, “Research on the MPPT algorithms of photovoltaic system based on PV neural network,” *Research on the MPPT algorithms of photovoltaic system based on PV neural network,* no. [https://ieeexplore-ieee-org.ezproxy.lib.uts.edu.au/document/5968501/authors#authors], p. 4, 2011. |
| [2] | K. P. Kroeger, C. Sanghun, B. M. Ali, J. B. Brian and K. T. Philip, “A digital implementation of continuous-time ripple correlation control for photovoltaic applications,” *A digital implementation of continuous-time ripple correlation control for photovoltaic applications,* no. [https://ieeexplore-ieee-org.ezproxy.lib.uts.edu.au/document/5437166/authors#authors], p. 5, 2010. |