International Journal of Advance Research in Science and Engineering
Volume No.07, Issue No.12, December 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

New approach of artificial intelligent technique for solar energy with boost converter to increase the system efficiency

Jaber Ghaib Talib[1], Hassan Farhan Rashag[2]

[1]Al-Mustaqbal university college, Private college, Iraq- Babylon

[2]Technical institute of Babylon. Al-Furat Al-Awsat Technical university, Kufa, Iraq

Abstract:

The classical system for solar energy with boost converter is used to produce the electrical power with low generation power and low consumption time and it needs more time for recharging the battery system. However, this classical system at heavy load is not suitable because of low efficiency for this system. to increase the system ability, the artificial intelligent based on genetic algorithm GA is applied to solar energy with boost converter. In this suggested method, the main target of GA is to increase time consumption power and to decrease the time charging for DC battery. The system is designed and executed by Simulink Matlab and showed that the results have authority over the old system.

Key words: Solar energy, Boost converter, Genetic algorithm.

Introduction:

Fuzzy logic and maximum power point tracking are applied for photovoltaic and solar energy to modified the system efficiency based on FPGA [1] [2] [3] [4] but the algorithm was slow response due to try and error for choosing the membership function in fuzzy logic. The DC to DC converter with boost converter is also used for photovoltaic system [6] [7] [9] [10]. The boost converter and MPPT are applied by many authors to enhance the system for full cell electric vehicles[11] [12].

Results of method

Genetic algorithms are frequently used to produce excellent answers to enhance and optimize problems by workers such as mutation, crossover and selection. Therefore, the steps of GA for solar energy are

1- Generate random chromosomes which called populations based on voltage and current for solar energy
2- Compute the fitness function for each chromosome
3- Generate new chromosomes and compute fitness function for each voltage and current
4- Select two parents of chromosomes.
5- Compute the crossover and mutation for voltage and current
6- Repeat the loop and select final fitness function for voltage and current for solar energy. Figure 1 shows the random generation for chromosome

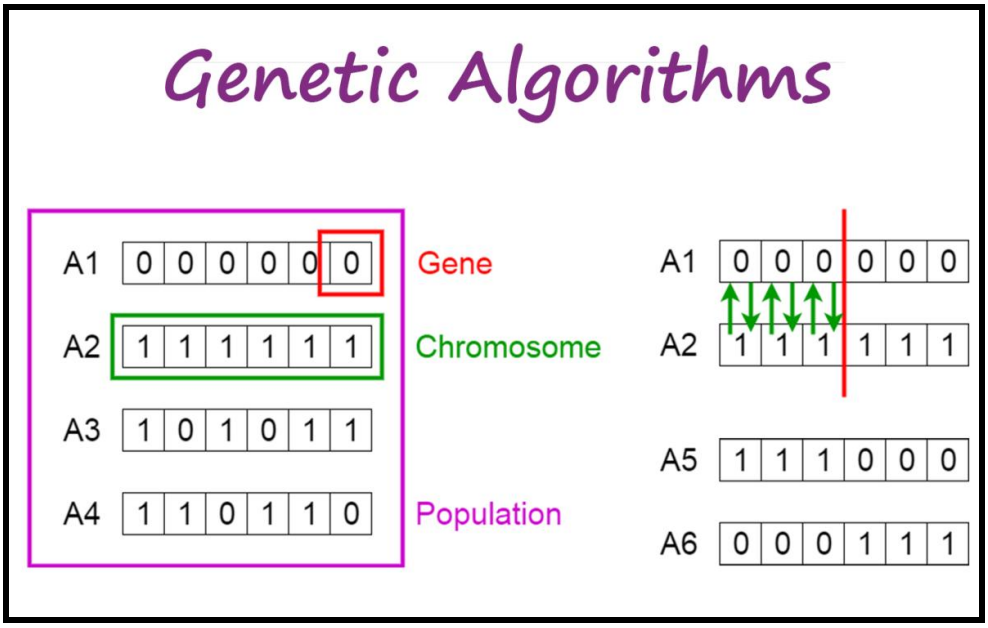

Figure 1: Random generation for chromosome

Figure 2, and 3 show the comparison results for voltage and current respectively between the proposed system with traditional system. the voltage with red color is highest than the conventional voltage and the current in proposed system is low which is equalto 30 A while the conventional current is 50 A.

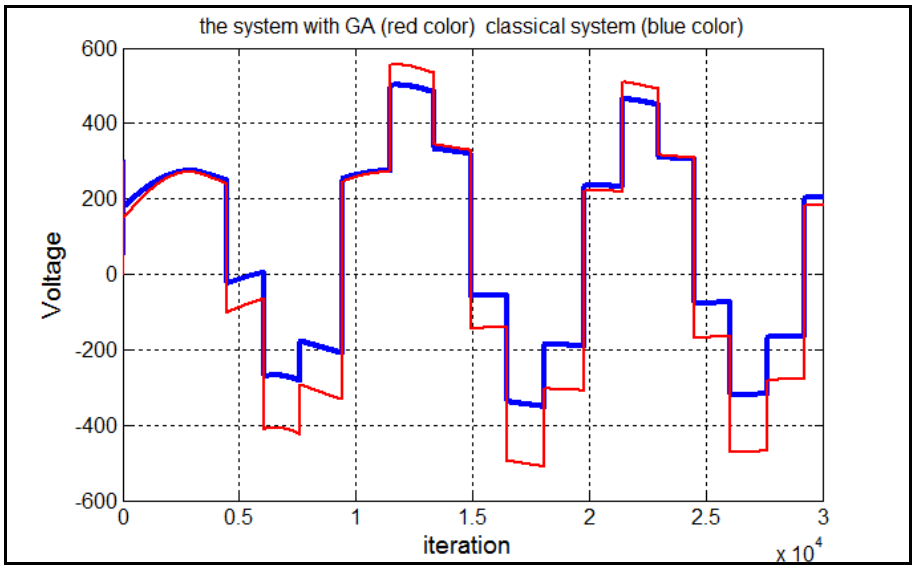

Figure 2: voltage comparison

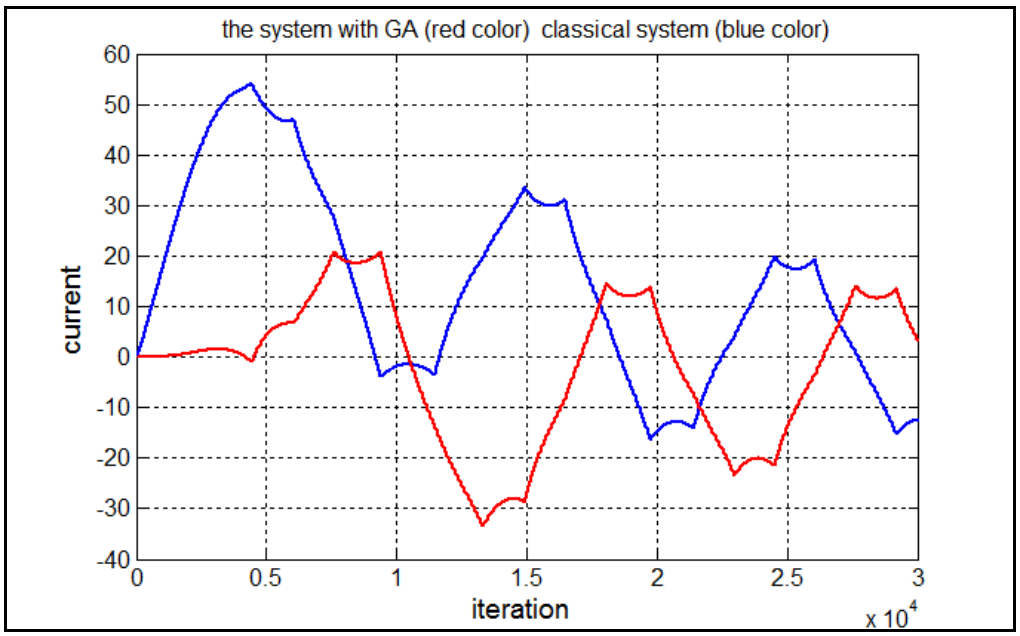

Figure 3: current comparison

Conclusion:

The artificial intelligent via GA has the capability to increase the efficiency of system. it can be noted from the results of this proposed method that the system with GA is more accurate and good performance as compare with classical method. Finally, GA algorithm is considered the best solution to optimize the voltage and current for solar energy.

References

1. Chekired, F.; Mellit, A.; Kalogirou, S.; Larbes, C. Intelligent maximum power point trackers for photovoltaic applications using FPGA chip: A comparative study. Sol. Energy 2014, 101, 83–99.
2. Kamarzaman, N.A.; Tan, C.W. A comprehensive review of maximum power point tracking algorithms for photovoltaic systems. Renew. Sustain. Energy Rev. 2014, 37, 585–598.
3. Messai, A.; Mellit, A.; Guessoum, A.; Kalogirou, S. Maximum power point tracking using a GA optimized fuzzy logic controller and its FPGA implementation. Sol. Energy 2011, 85, 265–277.
4. Eltamaly, A.M. Modeling of fuzzy logic controller for photovoltaic maximum power point tracker. In Proceedings of the Solar Future 2010 Conference, Istanbul, Turkey, 12 February 2010.
5. Chang, L.-Y.; Chao, K.-H.; Chang, T.-C. A High Voltage Ratio and Low Ripple Interleaved DC-DC Converter for Fuel Cell Applications. Sci. World J. 2012, 2012, 896508.
6. De Assis Sobreira, P., Jr.; Tofoli, F.L.; Braga, H.A.C.; Barbosa, P.G.; Ferreira, A.A. Analysis of mppt techniques applied to the dcm multiphase boost converter for the mitigation of partial shading in PV arrays. Eletrôn.Potên. 2013, 18, 1138–1148.]
7. Coruh, N.; Urgun, S.; Erfidan, T.; Ozturk, S. A simple and efficient implemantation of interleaved boost converter. In Proceedings of the 2011 6th IEEE Conference on Industrial Electronics and Applications (ICIEA), Beijing, China, 21–23 June 2011; pp. 2364–2368.

8. Lee, P.-W.; Lee, Y.-S.; Cheng, D.K.; Liu, X.-C. Steady-state analysis of an interleaved boost converter with coupled inductors. IEEE Trans. Ind. Electron. 2000, 47, 787–795.
9. Liccardo, F.; Marino, P.; Torre, G.; Triggianese, M. Interleaved dc-dc converters for photovoltaic modules. In Proceedings of the 2007 ICCEP'07, International Conference on Clean Electrical Power, Capri, Itlay, 21–23 May 2007; pp. 201–207.
10. Sri Revathi, B.; Prabhakar, M. Non isolated high gain DC-DC converter topologies for PV applications—A comprehensive review. Renew. Sustain. Energy Rev. 2016, 66, 920–933.
11. Garth, D.R.; Muldoon, W.; Benson, G.; Costague, E. Multi-phase, 2-kilowatt, high-voltage, regulated power supply. In Proceedings of the 1971 IEEE Power Electronics Specialists Conference, Pasadena, CA, USA, 19–20 April 1971; pp. 110–116.
12. Benyahia, N.; Denoun, H.; Badji, A.; Zaouia, M.; Rekioua, T.; Benamrouche, N.; Rekioua, D. MPPT controller for an interleaved boost dc–dc converter used in fuel cell electric vehicles. Int. J. Hydrogen Energy 2014,