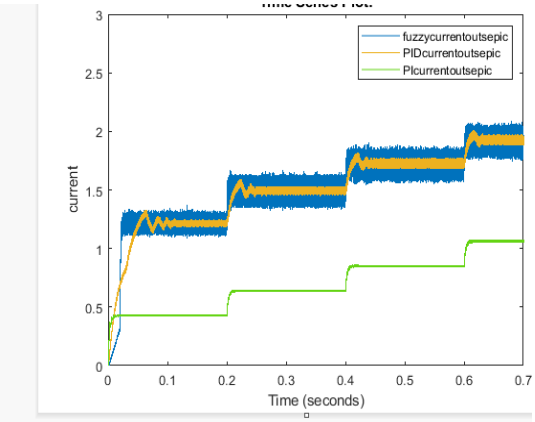

Figure 8: Output of voltage from the SEPIC converter

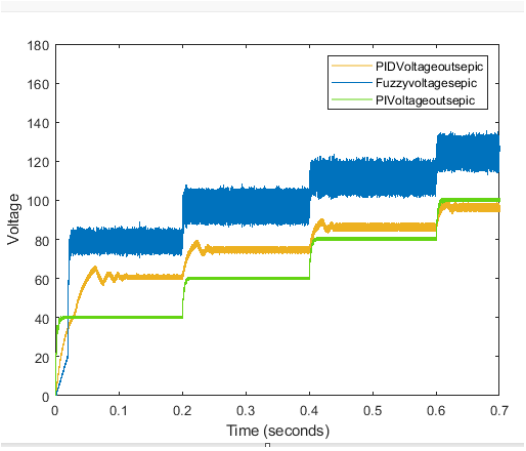

Figure 9: Output of voltage from the SEPIC converter

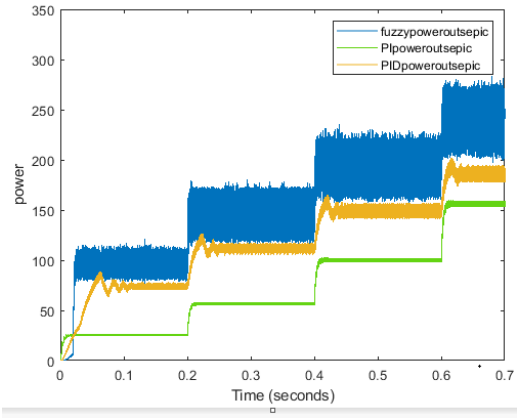

Figure 10: Output of voltage from the SEPIC converter

4. Tabulations

The proposed project has the three different controllers with SEPIC converter first we changed the irradiance level with respective to time and the irradiance levels were 400,600,800 and 1000. Now connect the controller, one by one at a time and the following results are observed in the graph. when the PI controller is connected, at the beginning stage the output obtained will be low but it will gradually increase with the time and irradiance. Next if the fuzzy controller is connected, the output will be higher than the others and the variations are higher and the increasing rate will be slower than PI controller. where PID and fuzzy logic controller has same average output.

5. Conclusion

In this project, the comparison of different inverters and controllers have done to identify the highly efficient performance for the output power. The existing system have only the low-level comparison.

The proposed system has the nine kinds of comparison to make highly efficient performance with the three kinds of converters and controllers. The combinations of these controllers, converters, MPPT algorithm to make a highest performance as mentioned above, the project can be extended to several future application areas to further improve the performance and reliability of the system and enable its application in a wide range of industries and fields. At the end of the project, it should be noted that the use of a modular multilevel inverter in combination with various controllers and converters offers several advantages. The modular multi-level inverter offers high-quality output waveform, low harmonic distortion and low electromagnetic interference (EMI), making it suitable for various applications such as motors, renewable energy systems and DC high-voltage (HVDC) transmission systems). . In addition, the various control strategies used in the project, such as PID, PI, and fuzzy logic controllers, have their unique advantages and limitations. The selection of the control strategy depends on the application requirements, system specifications and performance criteria. By using these control strategies in combination with the modular multilevel inverter and various converters, the project was able to achieve the desired performance and improve the overall system performance. The project has potential applications in various sectors such as

automotive, aerospace, renewable energy, and industrial automation. The project can help to improve the efficiency and reliability of electrical systems, reduce energy consumption, costs, and minimize the environmental impact of power generation.

References:

[1] Vijay K. Sood, Haytham Abdel Gawad. Power converter solutions and controls for green energy: 2019.

[2] Albertjr, V Anaja DS, Solar Energy assessment in various regions of Indian sub-continent. Solar Cells: 2020.

[3] Shanmugam Vanaja D, Stonier. Grid integration of modular multilevel inverter with improved performance parameters: 2021.

[4] Alhaji. F, El-Naggar KM, M. R. al Rashidi, A. K. al Othman, Renew Optimal percentage of artillery stimulates for one-star limits applying pattern energy. 2012; 44: 238–45.

[5] Zegaoui M, Allery P, Petit JP, Sawicki JP, Charles AW, BE Larbi. Dynamic behaviour of PV engine converting energy trackers under dissemination and heat changes Solar Energy. 2011; 85; 2953– 2964.

[6] Narendra, Sarat Kumar Sahoo, Raja Das. Fuzzy Logic Controller based Maximum power point tracking for PV system; 2016.

[7] Radjai, Tawfik, Rahmani, Lasher, Mekhilef Saad,etal. Implementation of a modified incremental conductance MPPT algorithm with direct control based on a fuzzy duty cycle change estimator using space. Solar Energy. 2014; 110; 325-33.

[8] Agyekum, E.B., Techno-economic comparative analysis of solar photovoltaic power systems with and without storage systems in three different climatic regions, Ghana. sustain. energy technol. Assess; 43, 100906.

[9] Ahmed, M.M., Hassanien, WS., Enany, MA. Modelling and Evaluation of SC MPPT controllers for PVWPS based on dc motor. Energy. 2021; 76044– 6053.

[10] Anani N, Ibrahim H. Adjusting the single-diode model parameters of a photovoltaic module with irradiance and temperature. Energies .2020; 13 (12); 3226.

[11] Vazquez S and Franquelo IG. Multilevel converters: control and modulation techniques for their operation and industrial applications. Proceedings of the IEEE. 2017; 105 (11); 2066- 2081.

[12] Albert Alexander Stonier, fuzzy logic control for solar PV fed modular multilevel inverter towards marine water pumping applications. Proceedings of the IEEE.2021; 9.

[13] C. Pavithra, Geethamani R, Radhakrishnan G, Kishore Kumar S, and Manoj C. A novel grid integrated perturb and observe MPPT controlled photovoltaic power plant for power enhancement, JCTN.

[14] C. Pavithra, Pooja Singh B, Venkatesa Prabhu Sundramurthy. A brief overview of maximum power point tracking algorithm for solar PV system. Materials Today Proceedings.

[15] A.stonier S, Murugesan R, Samikannu SK. venkata chary, s. s. kumar, and p. Arumugam. Power Quality Improvement in Solar Fed Cascaded Multilevel Inverter with Output Voltage Regulation Techniques. IEEE Access. 2020; 8; 178360–178371.