IoT Enabled Space Vector Modulation Control for Multilevel Converters in Renewable Energy Systems

Publisher: IEEE

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The capacity of Multi Level Converters (MLCs) to effectively incorporate Renewable Energy Systems (RES) into the power grid has attracted a lot of interest in recent years. High power quality, dependability, and smooth integration with Internet of Things (IoT) systems are all desirable but difficult to achieve with their control algorithms. This research proposes a solution to these problems by fusing the benefits of MLCs with IoT technology. The proposed Space Vector Modulation (SVM) control technique improves the performance and monitoring of MLCs using data-sharing capabilities of IoT devices that leads to more precise control and easier defect identification. In addition, the IoT platform enables remote monitoring, control, and diagnostics, which improves RES's operability. The findings show that the SVM control method provided by the IoT improves dynamic responsiveness, decreases overall harmonic distortion, and boosts power efficiency.

Published in: 2023 International Conference on Power Energy, Environment & Intelligent Control (PEEIC)

Date of Conference: 19-23 December 2023 **DOI:** 10.1109/PEEIC59336.2023.10450937

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Date Added to IEEE *Xplore*: 13 March 2024

Publisher: IEEE

ISBN Information:

Conference Location: Greater Noida, India

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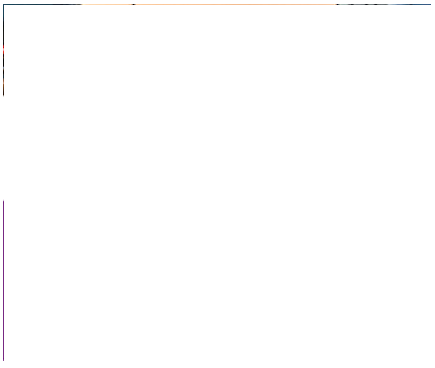
Curiosity in RES has grown in recent years, and so has an interest in technologies that might enhance the flexibility of utilities due to the drive for deregulation of the utilities. In both cases, power electronics systems are acknowledged as a crucial enabling technology. Power-conditioning systems are essential for RES, including wind turbines, solar panels, fuel cells, and microturbines. In addition to interfacing with the utility, these power-conditioning devices adjust the electrical properties of the sources to meet the needs of the loads and/or the utility. The power conditioning system (PCS) design is particularly intriguing since it makes use of MLCs, allowing investigation of the benefits and drawbacks of this kind of power conversion technology. For instance, there is a prevalent trend toward modularizing the hardware design in connection with the widespread adoption of MLC architectures in an effort to lower costs, simplify converter design, and perhaps enhance the accessibility of MLCs. As the no. of levels increases, so does the number of possible switching modes in the converters.



Published: 2018

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