

Title: Improving Fault Detection and Self-Healing in Smart Grids Through UPS Integration and Microgrid Expansion

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Abstract: This research proposes an innovative simulation-based model for fault detection and correction in a smart grid environment by the integration of UPS (uninterrupted power supply). This approach adopted the development of MATLAB codes to identify faults which were demonstrated as voltage drops in the simulation outputs. Following voltage drop, the grid manifested self-healing mechanism by restoring the voltage levels without any external interference. To further enhance the fault detection and correction ability of smart grids, this research investigated the integration of microgrid with the main grid in order to explore the UPS integration and Microgrid expansion simultaneously. The addition of microgrid to the main grid aimed to improve the self-healing mechanism after fault detection in smart grids by significantly reducing the time needed for the grid to normalize its voltage drop. This proposed model will thereby increase the overall reliability and efficacy of smart grid systems. The findings of this research highlight the potential benefits of integrating UPS in conjunction with microgrid network in a smart grid system. The proposed approach will eventually reduce the impact of faults leading to better performance and enhanced grid stability. The study contributes in the development of a self-sufficient and resilient smart grid system that can efficiently recover from operational challenges and fault occurrences.

Keywords: Fault Detection, Microgrid Expansion, Self-Healing, Smart Grid, UPS Integration

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