IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, July 2025
Impact Factor: 7.67

A Review: Adaptive Energy Supervisory Module for Optimized Energy Distribution in an Intelligent Microgrid Environment

Pankaj Moyal[1], Rajnish[2], Ravinder Singh[3]
M.Tech. Scholar, Department of EE
BRCM College of Engineering and Technology, Bahal (Bhiwani), India[1]
Assistant Professor, Department of EE
BRCM College of Engineering and Technology, Bahal (Bhiwani), India[2, 3]

Abstract: *The growing adoption of renewable and sustainable energy sources such as solar and wind has highlighted the need to seamlessly integrate these into existing power systems to promote sustainable energy solutions. Microgrids play a crucial role in enhancing grid performance by mitigating power quality issues. By operating as active filtering units, they provide reactive power support, harmonic suppression, and load balancing at the Point of Common Coupling (PCC).*

One major challenge with standalone DC microgrids is maintaining reliability, which can be addressed by interconnecting them with the main utility grid. In this context, an Artificial Intelligence-based Icosϕ Control Algorithm is introduced to optimize power sharing and enhance power quality in smart microgrid environments. This control strategy is designed to intelligently respond to uncertainties such as dynamic load changes, varying battery charge levels in microgrids, and fluctuations in electricity tariffs, which depend on the availability of renewable power.

The study delves into the coordinated operation of wind and solar-based microgrids connected to the main grid, emphasizing intelligent power flow control to alleviate grid stress and elevate power quality. A simulated model of a smart grid with multiple renewable-integrated.

Keywords: renewable and sustainable energy

DOI: 10.48175/IJARSCT-28519