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Boost Converter-Based Maximum Power Point Tracking of Solar Panels Using the P&O Algorithm

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Abstract: *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 microgrids is developed, incorporating dynamic tariff mechanisms and efficient energy distribution for better performance. The results validate the potential of combining ANN-based forecasting with IoT-enabled smart monitoring for managing power in multiple microgrids. This setup also lays the groundwork for future participation in energy trading. The final hardware prototype, equipped with the AI-based Icosϕ control logic, successfully operates under nonlinear load conditions, demonstrating the practical applicability of the proposed system.*

Keywords: renewable energy sources, artificial neural network, feed forward neural network, internet of things, energy trading