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Design of Optimal Power Point Tracking Hybrid Controller using Photovoltaic Power and Demand

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Abstract: *With the advent of grid-connected photovoltaic systems for energy generation, new technologies need to be created to maintain a continuous and stable balance between the supply and demand of generated electricity. Therefore, it is necessary to accurately predict the production and consumption of solar energy. Solar energy production and electricity demand are probabilistic and non-stationary in nature and are often incompatible. Imbalances in supply and demand can be costly and lead to long-term inefficiencies in power generation and distribution. The purpose of this work is to propose ways to balance the supply and demand of PV power generation and distribution systems. To achieve this, we will build and combine three different tools.*
1) Predictive model for predicting solar energy production,
2) Predictive model for forecasting demand, and
3) A real-time control algorithm that uses the output of a predictive model to adjust the output voltage of a PV system to maintain a balance between supply and demand.
Our prediction model is based on time series prediction tools and artificial neural networks. The control algorithm is called Optimal PowerPoint Tracking PowerPoint Tracking (OPPT) and is based on perturbation and monitoring algorithms. Use real-world data to evaluate the performance of a system that combines prediction and controller..

Keywords: OPPT(Maximum Power Point Tracking), SMC(Sliding Mode Control), SPWM(Switching Pulse Width Modulation), P&O(Perturb and Observe)

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