

# The effect of artificial solar power generation

Can artificial intelligence improve PV power generation?

>Integrating artificial intelligence (AI) into photovoltaic (PV) systems has become a revolutionary approach to improving the efficiency, reliability, and predictability of solar power generation. In this paper, we explore the impact of AI technology on PV power generation systems and its applications from a global perspective.

Does AI technology affect PV power generation systems?

In this paper, we explore the impact of AI technology on PV power generation systems and its applications from a global perspective. Central to the discussion are the pivotal applications of AI in maximum power point tracking (MPPT), power forecasting, and fault detection within the PV system.

Can artificial intelligence predict solar power generation?

Artificial intelligence (AI) approaches have the potential to be valuable tools for predicting solar power generation. This is because they can address the complex relationship between input and output data, which is nonlinear in nature.

How can artificial intelligence help a solar power system?

The comprehensive analysis of conventional and artificial intelligence-based controllers provides valuable insights into the nuanced trade-offs between performance and cost across various MPPT algorithms, aiding in informed decision-making for solar power systems. Further analysis of all controllers is given in Table 2.

Can artificial intelligence revolutionise solar energy management?

In this context, Artificial Intelligence (AI) in general and deep learning, in particular, emerge as a promising technology with significant potential to revolutionise solar energy management, primarily through the provision of accurate forecasts (Alam et al. 2022; Rai et al. 2021 ). In this regard, we postulate the following research questions.

Can artificial intelligence be used in photovoltaic systems?

The first approach is to investigate the applicability of artificial intelligence techniques in photovoltaic systems. The second approach is the computational study and analysis of data operations, failure predictors, maintenance assessment, safety response, photovoltaic installation issues, intelligent monitoring etc.

As global energy crises and climate change intensify, offshore wind energy, as a renewable energy source, is given more attention globally. The wind power generation system ...

The proposed design method is to calculate an optimal size of PV array unit which can provide a better energy-saving effect both in PV power and AC auxiliary charging, under the condition to ...

For the generation of electricity in far flung area at reasonable price, sizing of the power supply system plays an important role. Photovoltaic systems and some other renewable ...

However, dust, snow or any other natural or artificial shadowing can reduce the amount of solar irradiation received by the module. In addition, dust and air pollutants are absorbed by humid air, resulting in soiling ...

where  $P_{in}$  is the power of the incident light [39]. Alternatively, the PCE can be determined directly from the current density-voltage (J-V) characteristics of the solar cell, ...

In the era of boundless innovation, artificial intelligence (AI) has emerged as a driving force that reshapes industries and propels us into the future. When paired with the boundless potential of solar power, this dynamic ...

To address the difficulties of forecasting PV power generation and overcome its stochastically and uncontrollability nature due to fluctuations and uncertainty in solar irradiation ...

The recent global warming effect has brought into focus different solutions for combating climate change. The generation of climate-friendly renewable energy alternatives has been vastly improved and ...

This paper proposes a model called X-LSTM-EO, which integrates explainable artificial intelligence (XAI), long short-term memory (LSTM), and equilibrium optimizer (EO) to reliably forecast solar power ...