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This paper delves into the design, optimization and financial analysis of a novel, standalone hybrid energy system, integrating photovoltaic and fuel cell technologies, for an agriculture farm situated in Kairouan, Tunisia. Unlike conventional systems, this model foregoes battery storage in favour of hydrogen storage, generated through water ...

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The applications of solar energy in Tunisia are diverse. Solar PV systems are increasingly installed in residential, commercial, and industrial settings to generate electricity. Large-scale solar farms, such as the Tozeur photovoltaic plant, feed into the national grid, enhancing energy availability[10]. Solar water heating

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of a smart PV water pumping system designed to regulate the indoor environment of a hydroponic greenhouse ensuring optimum performance. The PV Hydroponic Greenhouse (PV-HG) system regulates the circulation of the hot or cold water to maintain ...

This work aims to create a sustainable agriculture system in Tunisia through the design and implementation of a smart photovoltaic (PV) hydroponic greenhouse. The greenhouse will utilize advanced technology to optimize plant growth and reduce water usage, while also incorporating solar panels to generate renewable

energy.

After choosing the structure and architecture of the system introduced, optimized PID controllers based on Artificial Neural Networks (ANN) are proposed, for the maximum power to be derived from the Photovoltaic (PV) solar source and the efficiency of the pump to be improved.

Agrivoltaic systems, which combine PV energy production with agricultural activities on the same land, offer promising synergies for both sectors, potentially mitigating competition between energy and food production [3-6]. Authors in [7] combined PV panels, a hydrogen producer, and a ground

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