

## Autonomous solar cooker (Heating plate) using both PV panels and batteries

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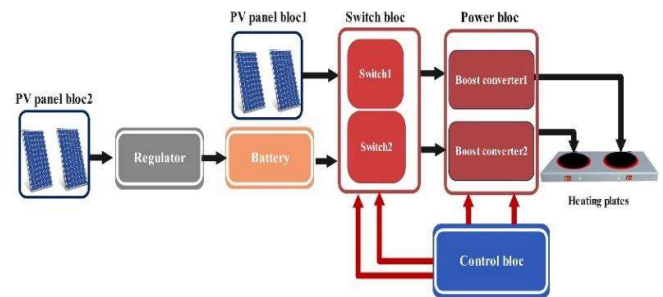
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### Abstract

The main aim of this paper is the design, experimentation and validation of a new autonomous cooking device powered by PV panels and solar batteries. The desired objective, within the framework of Next Generation SoCoNexGen project (2022-2025), in collaboration with European and African partners, is to propose an innovative cooker that works, day and night, according to the users' daily cooking needs. As shown in figure 1, the proposed cooker is made up of four photovoltaic panels with a power of 1.2 kWp, solar batteries (48V/200Ah) equipped with a charge/discharge regulator, a bloc of two power switches, two DC/DC boost converters controlled by a control and regulation bloc, and a heating plate with two resistors. One resistor is heated by two PV panels via DC/DC converter 1, and the other by the batteries via DC/DC converter 2. This innovative architecture allows the use of the cooker on a 24 hours scale. On sunny days, the cooker uses the PV panels power directly, while on nights and cloudy days, it uses the power stored in the solar batteries. The experimental results show that the efficiency of the solar cooker is above 90 %. The heating plate reaches a high temperature of around 500°C after 40 minutes of heating. Moreover, to validate our prototype with practical results, we experimented the reliability of the proposed system in heating 1 liter of water and 1 liter of oil respectively. The results support the effectiveness of the cooker. Indeed, the water reaches the boiling temperature after only 15 minutes, while the oil attains a temperature of 230°C after 20 minutes of heating. All the results obtained show better performances compared to the current solar cookers [1-5], in terms of temperature and cooking time, and its usefulness in both rural and urban areas.

Figure: Proposed solar cooker synoptic diagram with PV panels and solar batteries.



### Recent Publications

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### Biography



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