

# Binary Search Algorithm-based maximum power point tracking for photovoltaic system under partial shaded conditions

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## **Abstract**

This paper presents the study on the application of Binary Search Algorithm (BSA) to determine the maximum power point under partially shaded photovoltaic system. In partially shaded conditions, maximum power point tracking (MPPT) is a challenging task and prone to local maxima problem. The BSA-based algorithm, together with well-established PSO and another commonly used hill climbing method, perturb and observe (P&O) were developed and simulated in MATLAB Simulink. All three algorithms were examined under 15 different partial shaded test conditions. In order to further analyze the real time performance of the algorithms, hardware-in-the-loop (HIL) was utilized to emulate the behavior of the power converter while digital signal processor (DSP) was used to realize the MPPT algorithms. From the study, the BSA has shown a faster average convergence speed compared to PSO. It is also shown from the study that the BSA was capable to perform MPP tracking under partially shaded conditions, with the ability to obtain up to 99 % tracking efficiency.

**Keywords** - *Alternative energy, DSP, Photovoltaic, Real time Simulation*