

# MPPT Solar Controller: A Theoretical Design and Prototype Development

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**Abstract:** *This paper discusses the theoretical design and ongoing prototype development of a Maximum Power Point Tracking (MPPT) solar controller system aimed at efficient energy harvesting and smart load management. The system is designed to optimize energy extraction from a solar panel using MPPT algorithms, with smart load management for real-time power distribution. The controller incorporates cloud-based monitoring, AI optimization, and a user-friendly interface. The system is expected to deliver robust, efficient, and safe operation under varying environmental conditions*

**Keywords:** MPPT, solar energy, load management, AI optimization, cloud monitoring, prototype development