Photovoltaic on Fleek! Power Optimization for Photovoltaic Systems Using Power Equalization

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Photovoltaic systems are becoming increasingly important. There is a central challenge to be solved here. Due to the series connection, the weakest cell always determines the total output. This results in massive avoidable power losses due to shading effects of the weakest cell. We developed a concept for this in which we support the weaker cells individually and thus achieve a balance in performance. This means that we only lose the effectively shaded area. We developed several versions of an electronic circuit board and software for this purpose. We then evaluated and optimized this in detail. We have provided proof of functionality. If a part of the system is shaded, our system measures the shading. The software processes the collected data and regulates the electronics. This transforms the current from the stronger cells into the shaded cells. As the power required for this comes from the stronger cells, our system works autonomously. As a result, all cells always have the same output and there are no avoidable losses. We were able to demonstrate the effectiveness and efficiency of our system. A cost estimate showed additional costs of only $35 per module, with an expected additional yield of 10-20% compared to a photovoltaic system without support. This makes our system significantly more efficient than previous systems. We can thus make a substantial contribution to the fight against climate change.

Awards Won:
Fourth Award of $500