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An Optimized Electronic Device for Solar Power Harvesting Dedicated to Wireless Sensor Networks

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For economics as for practical reasons, this last decade, the use and dissemination of wireless sensor networks (WSN) became obvious; particularly in structural health monitoring (SHM) use-cases where distances between sensors could be long and access to the structure quite difficult.

Even if efforts are led to design small components and RF modules that ask for low-power, the need of an external source is often necessary.

After have acquired knowledge in solar cells as in batteries technologies and methods to control charge/discharge phases as in optimizing algorithms, IFSTTAR laboratory has designed an electronic device that integrates those progress.

This electronic device has a quite generic mission: for a panel of batteries chemistry (Lithium, NiMh) and a panel of solar cells sources (frome mW to some W), the system acts as an improved battery charger whatever the load ask for power.

The system applies control algorithms based on battery capacity and chemistry profile. It also applies the MPPT (Maximum Power Point Tracking) algorithm.

At any time, battery State Of Charge (SOC) can be requested via I2C bus as well as a warning signal is output when SOC becomes critical.

Through standard pin connectors and a simple I2C interface, the system can be used by many wireless devices (sensors) that have to run autonomously. After the presentation of this system, a focus on its application on a real use-case will be given.

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Ключевые слова:

Содержание

- Abstract
- Introduction
- Power manager board design
- Results
- Conclusions and roadmap