BATTERY-LESS REMOTE SENSORS WITH REVERSED PELTIER POWER SOURCE BASED ON ENERGY HARVESTING PRINCIPLE

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Abstract

The term Energy Harvesting is very popular recently in an area of low power wireless intelligent sensors. Reason is obvious. Direct power supply from main grid is possible mostly in industry zone. In user applications such as temperature sensors in home environment the battery usage is demand. Supplying sensors from electrochemical power sources is efficient only in case, when we get good access to the sensor eventually when we want to read data only for short period of time (range of days or weeks). Special events (oceanobiologist, seismic activities detection, detection of chemical substances in huge reservoirs atc.) requiring special electrochemical power sources, which are much more expensive of course. In this article we will present a modern way of powering intelligent sensors. Gaining the energy to supply sensors is possible even from immediate sensor's environment. The energy harvesting term is way, how to obtain this ubiquitous energy. At present day are as alternative power source very popular solar cells. This technology offer relatively high efficient energy conversion, about 15-25%. If we have big enough solar cell, so we can supply also energy more exacting sensors. In their shadow are moving power sources utilizing environment vibrations eventually sources, to whom a little thermal gradient will be enough. Sources, which are utilizing thermal gradient were always been overlooked, because of their very low efficiency (about 4%) and very low output voltage (order of tens of mV). Nevertheless theirs big advantage against other methods is obvious. They are supplying the energy from vibration less environment and without need of high intensity incident light. For running they are need only small thermal gradient of order of degrees. These power supplies get to foreground of interest relatively not long ago. Thanks to evolution of new MOS-FET transistors with very low value of RDSON (order of mOhm) is possible to use even very low voltage produced by thermal sources called Thermo Electric Generators. Our application is using sophisticated circuit from Linear Technology, which is capable to use even small energy bursts to discontinuous intelligent sensors operations. The heat energy is converted into electric energy which is stored in very high capacity capacitor (about 1F). In case, that accumulated energy is sufficient, the signal "Power Good" is generated. This signal is sign to sensor to perform measuring and data archiving. This power supply type is suitable everywhere, where is permanent thermal gradient such as ocean water, long lead heating pipes, air monitors on distant or hardly accessible places (shafts) etc.

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