



SENSOR TECHNOLOGY ALERT

OCTOBER 2007

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BATTERY-FREE WIRELESS COMMUNICATION TECHNOLOGY

It is increasingly becoming important to address power issues with the penetration of wireless sensing technologies in a wide range of application sectors. There are a number of generic energy harvesting solutions in the industry, which promise to effectively resolve the power issues in the space, but most of these solutions have not taken into account the application dynamics, which needs to be addressed while developing the solution. There are a few commercial players in the industry who have identified the need to address the application variance and developed systems that efficiently meet both technology and market needs.

Addressing challenges in this direction, GreenPeak Technologies, Netherlands, is a company, which has effectively understood the technology and market needs and directed its development initiatives to address these needs. It has recently come out with Ultra Low Power Wireless Sense and Control Solution, an open standard, easy to install wireless communication device for sensor applications that can operate without power cabling or a battery. It is a known fact that energy scavenging systems should efficiently scavenge energy locally and power devices eliminating the need to use a battery. Going further, it is necessary to incorporate the intelligence in the system as a whole to efficiently utilize the stored energy and safeguard the system whenever there is an energy crisis. Such developments perhaps demand understanding the nature of environment from which energy is scavenged and further the continuity of the source from which the energy is scavenged and finally the need of energy in the desired application. Based on all of this data, it is essential to device a pattern, which will govern the intelligence of the system as a whole. GreenPeak has effectively understood all of these needs and directed its development initiatives toward developing an efficient energy management algorithm and incorporated it successfully in its solution.

GreenPeak's new wireless communication devices leverage three key technologies that enable it to operate in a battery-free environment without cabling. First an ultra-low-power wireless transceiver and sensor interface design with

efficient power-up and power-down modes effectively enable the reduction of power consumption. Second is energy harvesting interface that enables the modules to utilize power provided by external solar, electromagnetic, and piezoelectric transducers. Third is a mesh technology that enables designers to create extended sensor networks without the need for battery-powered or cabled routing nodes. This innovative mesh technology is self-forming and self-healing, making it easy and inexpensive to install. GreenPeak has developed on-board power management circuits that will monitor the state of the energy harvesters and take appropriate actions to optimize the available energy. This allows the GreenPeak devices to operate in a battery-free environment in a reliable way.

Looking into the communication aspect, devices incorporated in the communication solution are both low powered and have got routing capabilities. The communication protocol powers only devices, which are immediately involved in the process of communication while keeping all other nodes in sleep mode. This enables the system to efficiently use its scavenged energy for the application. GreenPeak is initially offering its low-power communication technology as the 'Lime CM-08' module, a tiny 5 cm² (less than one square inch) electronic component that customers can integrate into their products. The tiny module functions as a stand-alone communication system, integrating a transmitter/receiver, antenna, and low-power mesh network software on a single device. The module's software is very customizable and can be configured to manage the power of different types of energy harvesting devices. It is also possible to integrate allied applications to the module eliminating the need of external processing units and reducing system cost predominantly.

Talking to *Sensor Technologies*, technologists from GreenPeak Technologies indicated that their future initiatives will focus on integrating its current solution on a single chip. By doing this, they are confident of reducing power consumption in the order of 30% and in parallel achieve creditable cost reduction benefiting the industrial society at large. They added that their focus on developing very reliable low power solutions and their efforts in producing application specific products are the key factors that enable them to make a mark in this competent industrial space.

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