

Intelligent Sensor Networks Advance Eco-sustainability

By H. Viswanathan

Welcome to the eco-friendly home of the future. As you approach the residence, your presence is detected as your mobile device interacts with the public and home networks to alert your home computer, broadband connections and other appliances, of your imminent arrival. Systems that were shut down to save power are appropriately turned on so that they are ready for use as you arrive. The home is warm and comfortable despite your unusual arrival time because you used your cell phone to turn on the heat earlier. Lights turn on and off automatically as you walk from room to room, and your favorite music plays softly... and only in the rooms that you occupy.

Sensor networks can play a significant role in maximizing your use of key technologies while minimizing energy consumption in places where we live and work. While traditional sensor-based, power-saving techniques have revolved around using motion detection devices, emerging sensor and actuation networks offer a plethora of possibilities for minimizing use of energy.

Humans are creatures of habit. As a result, it is not only possible to trigger device activation by physical presence or movement, but also to anticipate behavior patterns by correlating information collected from different sensors in order to activate key technologies automatically as they are imminently needed – and then deactivate and power down when they are not.

Information gathered from daily activation and deactivation times of key systems – such as home alarms, time-of-day-based thermostat settings and motion-sensing devices – can be used to accurately predict when residents are away from home. This information can then power down various equipment such as home gateways, home computers, water heaters and air-conditioning systems. With the deployment of femtocells – cellular base stations for homes and offices – additional behavior patterns can be gathered by detecting the presence of cell phones. Smart home networks, coupled with smart utility applications, can make significant progress to minimize overall energy consumption through demand-side load balancing.

These examples demonstrate how residential energy efficiency is achieved when sensors are used to monitor usage and optimally operate appliances and other home systems. In institutional environments – such as office buildings and hotels – sensors are being deployed for “people tracking” to dim all under-utilized hallway lights, only activating them as people approach.

Bell Labs is currently engaged in efforts to develop technology enablers such as intelligent middleware and service aggregation that will help service providers and enterprises to deploy new services using standards-based sensor technology. ❄

Harish Viswanathan is Director, Alcatel-Lucent CTO/NTS, Murray Hill, NJ, USA.

To contact the author or request additional information, please send e-mail to enrich.editor@alcatel-lucent.com.