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An Autonomous Wireless Body Area Network Implementation Towards IoT Connected Healthcare Applications

Internet of Things (IoT) is a new technological paradigm that can connect things from various fields through the Internet. For the IoT connected healthcare applications, the wireless body area network (WBAN) is gaining popularity as wearable devices spring into the market. This paper proposes a wearable sensor node with solar energy harvesting and Bluetooth low energy (BLE) transmission that enables the implementation of an autonomous WBAN. Multiple sensor nodes can be deployed on different positions of the body to measure the subject's body temperature distribution, heartbeat and detect falls. A web-based smart phone application is also developed for displaying the sensor data and fall notification. To extend the lifetime of the wearable sensor node, a flexible solar energy harvester with an output based maximum power point tracking (MPPT) technique is used to power the sensor node. Experimental results show that the wearable sensor node works well when powered by the solar energy harvester. The autonomous 24 hours operation is achieved with the experimental results. The proposed system with solar energy harvesting demonstrates that long-term continuous medical monitoring based on WBAN is possible provided that the subject stays outside for a short period of time in a day.