

Theme : Energy Harvesting

Subject : Energy Harvesting and Management for IoE Devices

Introduction

The goal of this research project is to explore novel methods for energy harvesting and management for IoE devices. As wireless sensor nodes are expected to be used widely in IoE applications, increasing the life-time of IoE devices is one of the most important research topics. In this research project, we focus on energy harvesting from the various in-door ambient power sources that can replace the batteries.

For the novel energy harvesting from the ambient power sources in wireless sensor node, we expect to increase the harvested power from a single/multiple in-door ambient power source(s).

Scope

Challenges that significantly increase the harvested power from a single/multiple in-door ambient power source(s) include:

- Methods for increasing the harvested power from a single in-door ambient power source. The strong candidates of the ambient power sources are in-door solar power and vibration power.
- Methods for increasing the harvested power from multiple in-door ambient power sources in a single wireless sensor node.
- The method for estimating the future state of charge for a wireless sensor node that uses energy harvesting from a single/multiple in-door ambient power source(s).

Research questions

We are interested in the following research questions. These questions are not exhaustive but different research questions are open to discuss with research partners.

- What would be strong candidate for in-door ambient energy harvesting and how would its harvested energy be increased to meet the required power for wireless sensor node?
- What would be the most effective the best combination of the various in-door ambient power sources that can achieve the maximized harvested power?
- Is it possible to design the multi-modal harvesting hardware that can be used for small wireless sensor nodes? Is it able to harvest the energy from multiple power sources simultaneously or has it to choose one of them based on the condition of the power sources?
- What would be the best method for estimating the future state of charge for a wireless sensor node that uses energy harvesting from a single/multiple in-door ambient power source(s)? In case of energy harvesting from multiple in-door ambient power sources, is it possible to switch the harvesting method based on the estimation, if the simultaneous energy harvesting is not supported by the hardware.

Expected Deliverables

The following is open to discussion:

- Suggestion of the method of energy harvesting responding to the above research questions
- Detailed progress reports every 3 months summarizing accomplishments.
- Prototype samples
- Patents and/or Conference/Journal Paper with Samsung Electronics (if agreed)