

## **Abstract**

Power consumption is a key issue for a wireless sensor network (WSN) because most sensors' batteries are non-rechargeable. To maximize the lifetime of the WSN, sensors need to turn off the power whenever possible so as to reduce the power consumption. When sensors turn on the power, they not only act as sensing devices that collect interested data from the environment, but also act as internetworking devices that forward data to the sink. Therefore, the active sensors need to collaboratively cover the interested area and to maintain a simple network topology for the data communication as well. Many researchers propose many strategies to handle these two tasks at the full duty cycle mode, but these strategies do not work properly at the low duty cycle mode. Special considerations are, therefore, needed for the low duty cycle environment.

We propose this project to investigate this coverage issue and provide solutions. The objectives of the project are to explore the coverage problem of the WSN under the low duty cycle mode and to propose energy-efficient schemes to provide coverage while considering other network constraints.

The values of the project are as follows: (1) We expect that the proposed schemes can greatly reduce the power consumption of sensors so as to maximize the lifetime of the WSN. (2) Proposed strategies can be applied to applications based on IEEE 802.15.4 standard, which aims to support low data rate, low duty cycle wireless personal area network (WPAN) applications.

The result of this project can also contribute to our current on-going projects "Extended Cluster-tree Scheme for Low-Rate Low-Power wireless Sensor Networks" and "Design a Cluster-Mesh Network for Low Duty Cycle Wireless Sensor Networks".