

An Efficient hole Recovery Method in Wireless Sensor Networks

Mary Wu

Dept. Of Computer Culture, Yongnam Theological University and Seminary, Korea
mary-wu@hanmail.net

Abstract— In a wireless sensor network, since sensor nodes are separated from the sensor network area due to environmental obstacles or are randomly placed in the area of interest, there are cases where there are no sensor nodes in some areas. In addition, a hole may occur in the sensor coverage area due to the sensor node running out of energy or physical destruction of the sensor node. A coverage hole in a sensor network may adversely affect the performance of a sensor network, such as reducing the reliability of data sensed by the sensor network and worsening the data transmission load due to a change in the sensor network topology or disconnection of the data link. The coverage hole can be recovered by discovering the coverage hole that has occurred and additionally placing new sensor nodes in the detected coverage hole. This can be solved by finding the coverage hole that has occurred, and recovering the coverage hole by additionally placing new sensor nodes in the detected coverage hole at appropriate locations. Existing studies on coverage hole recovery suggest a very complex method for discovering a coverage hole by identifying a coverage hole boundary node and recovering a coverage hole through the two-step process of finding a hole and recovering a coverage hole. This study does not separate the process of discovering and recovering a coverage hole in a sensor network, but determines whether a sensor node is a hole boundary node or a hole interior node by checking the connection line structure of its one-hop neighbor node. The hole boundary nodes determine the location of the mobile node to be added by a simple calculation, and perform coverage hole recovery. The proposed method is expected to have better efficiency in terms of complexity and message transmission compared to previous methods.

Keyword— Sensor network, Coverage hole, Boundary node, Connection line, Isosceles triangle



Mary Wu was born in Korea in 1973 and received a BS in Mathematics from Yeungnam University in 1996, a MS in Computer Science in 2001, and a Ph.D in Computer Science in 2005. She has been a computer professor at Youngnam Theological University and Seminary since 2013. Her research interests include sensor network, social network analysis, bigdata, IoT, metaverse education and so on, .