

Energy-Efficient Systems for Smart Sensor Communications

A wireless sensor network (WSN) is a communication network with ad hoc configuration consisting of tiny, low-power, low-cost sensors which are normally distributed in a decentralized fashion and have limited processing capability. WSNs have found a wide range of applications such as industrial process control, healthcare monitoring, surveillance, forest fire detection, natural disaster detection, target tracking, among many other applications. It is known that WSNs are resource-constrained, hence, energy efficiency is crucial for all applications of WSNs to extend the life span of the sensors' batteries. The most energy consuming operation in WSN is data communication, hence, it is important to reduce amount of data transmission through WSNs without significantly affecting the transferred information. In this presentation we will focus on two directions of data-efficient signal representations that are expected to provide WSNs with sufficient energy control. The first direction is the use of intelligent short word-length (SWL) systems via embedded sigma-delta modulation, and the second direction is to use compressive sensing (CS) with chaotic sequences. If security is a factor, then CS via chaos can support secure communication in addition to its main function as a technique for data compression.



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