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WIRELESS SENSOR NETWORK

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Abstract

In Wireless Sensor Networks (WSN) having a high density of sensor nodes, spatially correlated measurements are transmitted, often redundantly, by many of the nodes whenever an event of interest is detected. In this work, we propose a correlation model to enable energy-efficient methodologies that exploit the spatial correlation at routing and MAC layers. At the routing layer, we first demonstrate how, through proper tuning, WSN is partitioned into disjoint correlated clusters without degrading the information reliability, thus enabling significant energy saving. On the other hand as an another contribution, at the MAC layer, we investigate the impact of correlation between nodes on achieved distortion in event estimation. We demonstrate that the same level of distortion constraint is achieved by selecting lesser nodes than those of existing correlation models. Furthermore, we show that even lesser number of representative nodes achieve the same event reliability when the selection criteria is based on a combination of correlation as well as received signal strength of the event source.

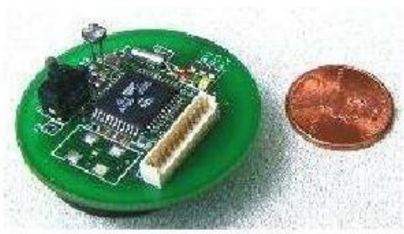
INTRODUCTION

WHAT IS WIRELESS SENSOR NETWORK (WSN) ?

Wireless Sensor network(WSNs) is composed of tiny electronics devices, known as sensor node, distributed over a area/region to observe some phenomenon. Some typical measures that can be observed by sensor nodes are temperature, pressure, humidity and light etc. With recent developments, there are many applications, where sensor nodes (S-nodes) are deployed to interact with environment. This allows us real time information whenever it is needed immediately. In fact, any kind of automation can be possible by using set of sensor nodes. For example sensors automatically detect the fire, set of sensors monitor the human and animal movements etc. Here, we are trying to give the general overview of various papers and sites related to sensor networks, Wireless sensor networks,

The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and communications bandwidth. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. The propagation technique between the hops of the network can be routing or flooding.

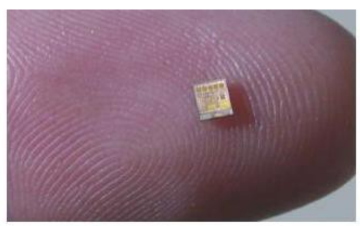
SENSOR NETWORK


WeC (1999)


Rene (2000)


Dot (2001)


MICA (2002)


Speck (2003)


Telos (2004)

VEHICLE TRACKING

A **vehicle tracking system** combines the installation of an electronic device in a vehicle, or fleet of vehicles, with purpose-designed computer software at least at one operational base to enable the owner or a third party to track the vehicle's location, collecting data in the process from the field and deliver it to the base of operation. Modern vehicle tracking systems commonly use GPS or GLONASS technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via the Internet or specialized software. Urban public transit authorities are an increasingly common user of vehicle tracking systems, particularly in large cities.

VEHICLE TRACKING SYSTEM

VOLCANO MONITORING SYSTEM

When a volcano begins to show new or unusual signs of activity, our monitoring data help us answer critical questions necessary for assessing and then communicating timely information about volcanic hazards. For example, prior to the 2005 activity at Mount St. Helens our monitoring equipment recorded a large increase in earthquake activity. Scientists quickly examined other monitoring data including gas, ground deformation, and satellite imagery to assess if a magma or fluid was moving towards the surface. Based on the history of the volcano and the analysis of the monitoring data we were able to determine what types of materials could be moving towards the surface. The possible magma and fluid compositions helped us figure out what types of hazards could potentially occur. The possible types of hazards help determine what real-time warnings are needed to prevent loss of life and property damage