

Working, design issues and applications of wireless sensor network

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Abstract

Wireless sensor networks (WSN) also known as wireless sensor and actuator networks (WSAN). These are distributed autonomous sensors for monitoring environmental or physical conditions, like sound, temperature pressure, etc. and used for passing their data via the network to a main location. These are measurement tools which are equipped with transmitters for converting the signals into a radio transmission from process control instruments. Receiver interprets the radio signal after that converts the wireless signal to a desired or specific output, like a data or Analog current analysis via computer software.

Keywords: WSN; WSAN; Autonomous; Nodes

1. Introduction

The growth of wireless sensor networks was inspired by military applications such as battlefield inspection and surveillance. Wireless sensor networks are used in various consumer and industrial applications, such as machine health monitoring, industrial process control and monitoring, and so on. The WSN is made from "nodes" – from a few to several hundreds or thousands, where each node is connected to one or more than one sensor. Each such sensor network node has various parts like: a radio transceiver with connection to an external antenna or an internal antenna, an electronic circuit for interfacing with the sensors and an energy source, a microcontroller etc. A sensor node might vary in size and cost depending upon the individual sensor node's complexity. The topology to be used in WSN varies from a simple network to an advanced wireless mesh network.

2. Working

The working of wireless sensor networking is based upon its construction. Wireless Sensor network contains small and large nodes those are known as sensor nodes. These nodes vary in size. These nodes depend upon the size. Wireless sensor networking uses sensor nodes which are designed in such a way that they have a radio transceiver for generating radio waves, a microcontroller for monitoring, various type of wireless communicating devices and an energy source like as battery. The whole network worked concurrently by using various sensor's dimension and worked on the concept of multi routing algorithm which is also known as wireless ad hoc networking. Sensor-actor and actor-actor coordination is explored by [Akyildiz and Kasimoglu, 2004]. The authors explain the fundamental concepts and practical aspects of WSN [Dargie and Poellabauer, 2010]. The authors describe the applications of WSN in the areas as infrastructure protection and security [Sohraby et al., 2007]. The author discussed about highly integrated wireless sensing for body area network applications [Peiris 2013]. Energy scavenging to power remote sensor sensors is described by [Karanassios, 2013]. Crime Complaint Center helps to collect reports of Internet crime from the public [6]. The authors describe the design and deployment of a WSN based system for monitoring the productive cycle of high quality wine in a Sicilian winery [7]. The authors developed a novel formal Agent-based Simulation Framework (FABS).

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FABS based on formal specification as a means of clear description of WSN sensing a complex adaptive environment [8]. A novel framework for secure information aggregation in large sensor network proposed in which some nodes are known as aggregators that help to aggregate the information requested by query [9]. The working concept of WSN shown in Figure 1.

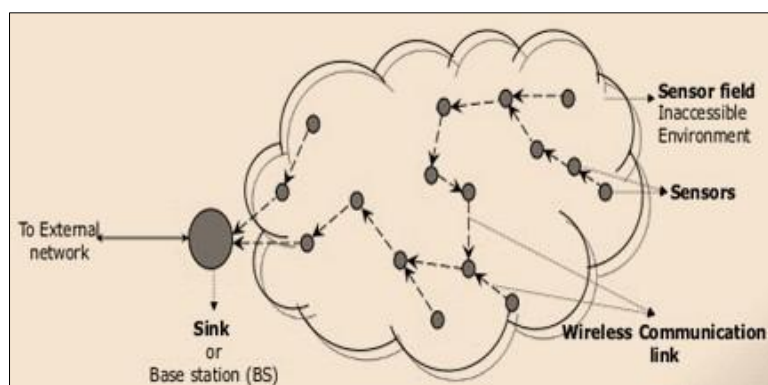


Figure 1 Working of WSN

2.1. Design Issues

Various issues related to wireless sensor network are discussed one by one.

- **Fault Tolerance:** The protocols deployed in a WSN should be able to discover failures as fast as possible. They should be robust enough to handle many failures while maintaining the overall efficiency and functionality of the network.
- **Power Consumption:** The size of nodes can limit the size of battery. The hardware and software design needs to be carefully considered the issues of energy use efficiently.

2.2. Applications of WSN

- **Military Applications**

Wireless sensor networks are an integral part of military intelligence, military command, military control, targeting systems, communications, battlefield surveillance, computing, intelligence, reconnaissance and targeting systems.

- **Area Monitoring**

In the field of area monitoring, various the sensor nodes are deployed over a region where some event to be monitored. Whenever the sensors detect any type of event being monitored then the event is reported to one of the base stations, which can take appropriate action.

- **Transportation**

WSN can be used to collect information related to real time traffic and used to alert the drivers of traffic and congestion problems.

- **Health Application**

WSN can be used in various health areas like diagnostics, patient monitoring and drug administration in hospitals, tele-monitoring of human's physiological data, and monitoring & tracking doctors or patients inside a hospital.

- **Structural Monitoring**

Wireless sensors can be used to monitor any type of movement within infrastructure and buildings such as flyovers, bridges, tunnels etc for enabling Engineers to monitor assets remotely without the need for costly site visits.

- **Industrial monitoring**

Wireless sensor network can also be used for Industrial monitoring and overheads and costs can be limited.

- **Agricultural sector**

Wireless sensor networks can also be used for agricultural sector which enables more efficient use of water and reduce waste.

3. Conclusion

The advancement of wireless networking and sensor technology open an opportunity for managing the human activities in a smarter way. Wireless Sensor Networks can set up an intelligent network that can handle applications related to user requirements. In future, WSN will put a great impact on human life.

Compliance with ethical standards

Acknowledgments

During this research paper, I have put my best efforts for completing this research paper. I hope that this research paper will be helpful for the future authors who want to do further research related to WSN.

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