

WIRELESS SENSOR NETWORK: Working, Design issues and Applications

Sarbjeeet Singh

Assistant Professor, Computer Science and Applications, Guru Nanak College, Panjab University,
Punjab, India

Email – rakeshuppall44@gmail.com

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 sused 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 an data or analog current analysis via computer software.*

Key Words: WSN, WSAN, Autonomous, software.

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 sensors. 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 varies 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.

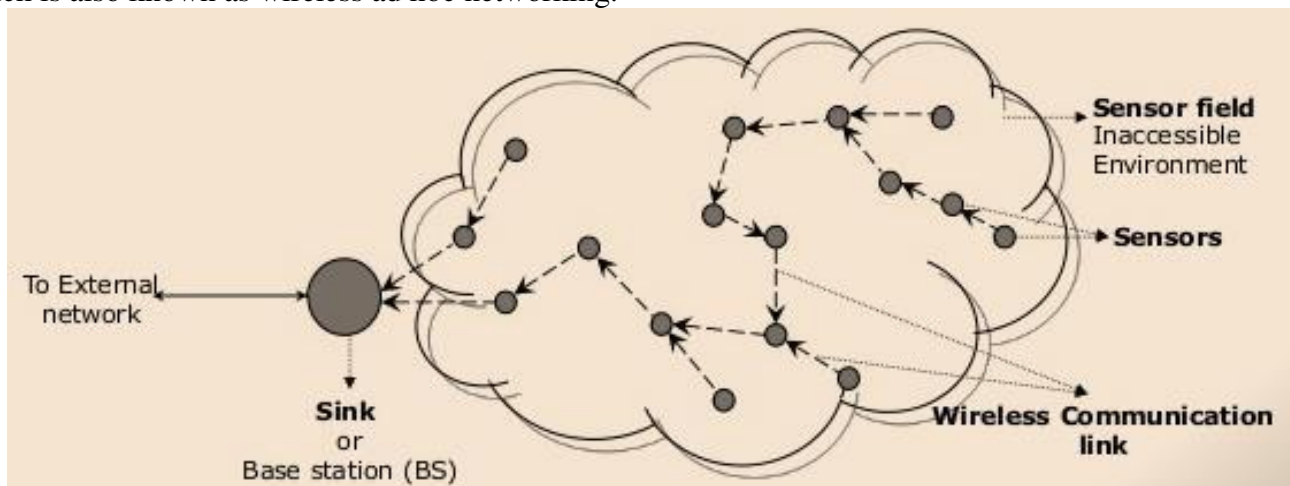


Fig. 1: Working of WST

3. DESIGN ISSUES OF A WIRELESS SENSOR NETWORK:

Various design issues are:

- **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 a large number of failures while maintaining the overall efficiency and functionality of the network.
- **Scalability:** Sensor networks varies from numerous nodes to several hundred thousand. So, the density of deployment is also variable. The density of For collecting high-resolution data might reach the level where a node has several thousand neighbours in their transmission range for collecting high-resolution data. The protocols deployed in WSN need to be scalable to these levels.
- **Production Costs:** Production cost can be reduced if a sensor networks is able to compete work with traditional information gathering approaches and only if the individual sensor nodes are produced very cheaply.
- **Hardware Constraints:** Every sensor node needs to have a processing unit, a power supply, a sensing unit and a transmission unit. So, these devices needs to be always balanced against low-power requirements and cost.
- **Sensor Network Topology:** Topology Maintenance is required for reducing the consumption of energy in wireless sensor networks.
- **Transmission Media:** The communication between the nodes can be implemented by using optical or infrared communication, radio communication etc.
- **Power Consumption:** The size of the nodes can limit the size of the battery. The hardware and software design needs to carefully consider the issues of energy use efficiently

4. APPLICATIONS OF WSN: Various applications of WSN are given below-:

- **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 applications:** 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 networks 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 reduces waste.

5. ACKNOWLEDGEMENT:

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 Wireless sensors network.

6. CONCLUSION:

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

REFERENCES:

1. F. Akyildiz and I.H. Kasimoglu (2004). "Wireless Sensor and Actor Networks: Research Challenges". *Ad Hoc Networks*. 2 (4): 351–367.
2. Dargie, W. and Poellabauer, C. (2010). *Fundamentals of wireless sensor networks: theory and practice*. John Wiley and Sons. pp. 168–183, 191–192 .
3. Sohraby, K., Minoli, D., Znati, T. (2007). *Wireless sensor networks: technology, protocols, and applications*. John Wiley and Sons. pp. 203–209. .
4. Peiris, V. (2013). "Highly integrated wireless sensing for body area network applications". SPIE Newsroom.
5. Spie (2013). "Vassili Karanassios: Energy scavenging to power remote sensors". SPIE Newsroom.
6. Internet Crime Complaint Centre link: www.ic3.gov
7. Anastasi, G., Farruggia, O., Lo Re, G., Ortolani, M. (2009) *Monitoring High-Quality Wine Production using Wireless Sensor Networks*, HICSS 2009.
8. *TinyOS Programming*, Philip Levis, Cambridge University Press, 2009
9. Muaz Niazi, Amir Hussain (2011). A Novel Agent-Based Simulation Framework for Sensing in Complex Adaptive Environments. *IEEE Sensors Journal*, Vol.11 No. 2, 404–412
10. Przydatek, Bartosz; Dawn Song; Adrian Perrig (2003). "SIA: secure information aggregation in sensor networks". *SenSys*: 255–265.