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Wireless Sensor Network a New Paradigm for Sensing and Communicating the Efficient Approach

[1] Bhattu.Harikrishna, [2] Dr. Mohammed Abdul Haque Farquad

[1] PhD Scholar, Department of Informatics, OU, Tarnaka, Hyd, India

[2] Associate Professor, Department of CSE, SRIIT, Ranga Reddy, India

Abstract - In the Aspect of technological evolution, We have reached to the some extend of boundary level where we just going for the quality , robustness, efficiency and many more factors which analyses to show the today's technology; Symmetrically there are many parameters which major the above mentioned factors likely various institutes like CMMI, ISO and many more. Hence, Keeping all those factors into the major from of nest generation technology, we emphasizes on the technological aspect of considering the one of the well known technology is Wireless Sensor Network(WSN) which makes us today's global market to small village i.e. global e-village. In this Paper, we emphasis on the conceptual model related WSN along with some changeling factors like advancement, swift and many more.

Keywords - *WSN, Node, Sensor, Application, Robust.*

1. Introduction

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to monitor physical or environmental conditions. A WSN system incorporates a gateway that provides wireless connectivity back to the wired world and distributed nodes. The wireless protocol you select depends on your application requirements. Some of the available standards include 2.4 GHz radios based on either IEEE 802.15.4 or IEEE 802.11 (Wi-Fi) standards. A WSN node contains several technical components. These include the radio, battery, microcontroller, analog circuit, and sensor interface. When using WSN radio technology, you must make important trade-offs. In battery-powered systems, higher radio data rates and more frequent radio use consume more power. Often three years of battery life is a requirement, so many of the WSN systems today are based on ZigBee due to its low-power consumption. Because battery life and power management technology are constantly evolving and because of the available IEEE 802.11 bandwidth, Wi-Fi is an interesting technology. The second technology consideration for WSN systems is the battery. In addition to long life requirements, you must consider the size and weight of batteries as well as international standards for shipping batteries and battery availability.

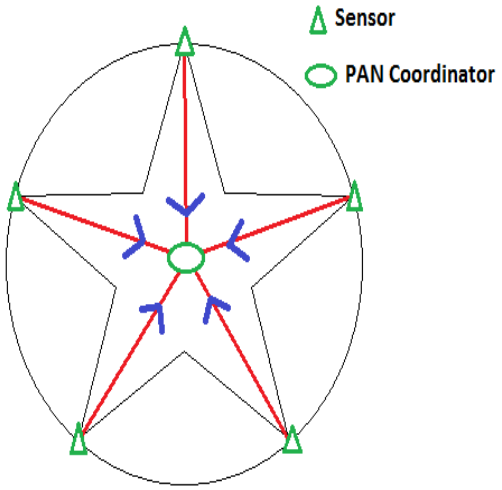

Fig.1 Showing the Sensor with Node the cyclic flow

The low cost and wide availability of carbon zinc and alkaline batteries make them a common choice. To extend battery life, a WSN node periodically wakes up and transmits data by powering on the radio and then powering it back off to conserve energy. WSN radio technology must efficiently transmit a signal and allow the system to go back to sleep with minimal power use. This means the processor involved must also be able to wake power up, and return to sleep mode efficiently. Microprocessor trends for WSNs include reducing power consumption while maintaining or increasing processor speed. Much like your radio choice, the power consumption and processing speed trade-off is a key concern when selecting a processor for WSNs. This makes the x86 architecture a difficult option for battery-powered devices.

2. Related Work

WSNs are used to monitor and reliably estimate a phenomenon from the collective information provided by

its constituent sensor nodes. Due to the high density of the sensor nodes, the data obtained from them are usually correlated in both space and time. Adaptive sampling is a method that employs this spatial-temporal correlation inherent in WSNs to obtain an energy-efficient estimate, in the second half of this thesis, a distributed, hierarchical, cluster-based adaptive sampling framework is proposed using multiple manifestations for estimation in three-dimensional environment. Nodes sensing highly correlated values in space are grouped to form clusters and these clusters are modified based on variation in sensor data over time. Energy efficiency is achieved through minimization of communication costs by restricting data communication to the local domain (within clusters) and by applying sleep mode. Moreover, a phenomenon is more reliably captured by using multiple manifestations than by using a single manifestation. It ensures joint optimization by adaptively varying the sampling rates in both space and time domains.

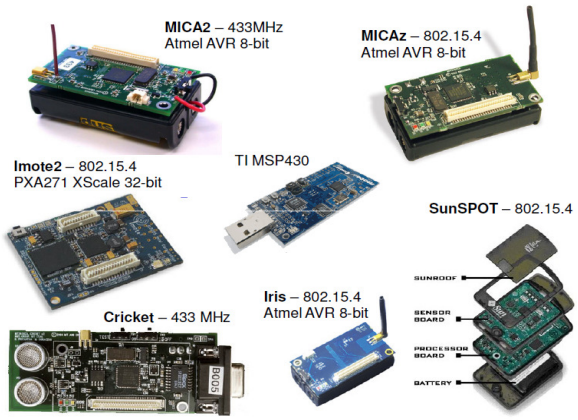

Fig.2 Showing the various Uses of the WSN and related Application

Engineers have created WSN applications for areas including health care, utilities, and remote monitoring. In health care, wireless devices make less invasive patient monitoring and health care possible. For utilities such as the electricity grid, streetlights, and water municipals, wireless sensors offer a lower-cost method for collecting system health data to reduce energy usage and better manage resources. Remote monitoring covers a wide range of applications where wireless systems can complement wired systems by reducing wiring costs and allowing new types of measurement applications. Remote monitoring applications include:

- Environmental monitoring of air, water, and soil
- Structural monitoring for buildings and bridges
- Industrial machine monitoring
- Process monitoring
- Asset tracking

3. Methodology

In the Mechanism of technological advancement, we likely follow up the following parameters which conceptually make us to precede the requirement in the modern era, where Industry is beyond the coverage.

Fault tolerance
The network functionality must be maintained even though the built-in dynamic nature and failures of nodes due to harsh environment, depletion of batteries, or external interference make networks prone to errors.

Lifetime
The nodes are battery powered or the energy is scavenged from the environment and their maintenance is difficult. Thus, energy saving and load balancing must be taken into account in the design and implementation of WSN platforms, protocols, and applications.

Scalability
The number of nodes in WSN is typically high. Thus, the WSN protocols must deal with high densities and numbers of nodes.

Real-time
WSNs are tightly related to the real world. Therefore, strict timing constraints for sensing, processing, and communication are present in WSNs.

Security
The need for security in WSNs is evident, especially in health care, security, and military applications. Most of the applications relay data that contain private or confidential information.

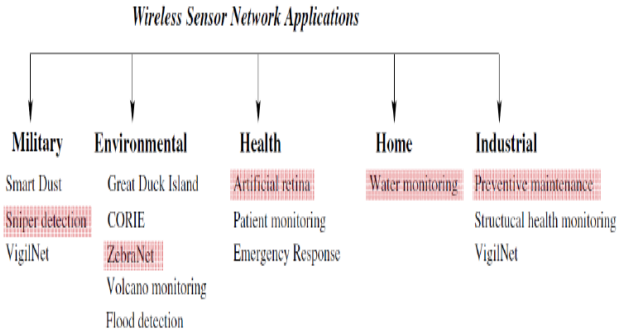

Fig.3 The Various Application Portfolio of WSN

Low rate, low power consumption and low-cost consumption are the key points that lead to the specification of the IEEE 802.15.4 standard. Actually the IEEE 802.15.4 protocol specifies the Medium Access

Control (MAC) sub layer and physical layer for the Low-Rate Wireless Private Area Networks. Even though standard was not developed for the sake of Wireless Sensor Networks, it is still suitable for them because Sensor Networks can be built from the Low-Rate Wireless Private Area Networks. According to IEEE 802.15.4 for a device (sensor) there can be at most three operational modes • Personal Area Network (PAN) Coordinator: This is the principal controller of the entire network this device identifies its own network, to which other devices may be associated. • Coordinator: The Coordinator has no capability of creating its own network; A Coordinator does the synchronization services through transmission of beacons. Such a coordinator must be associated to a PAN Coordinator.

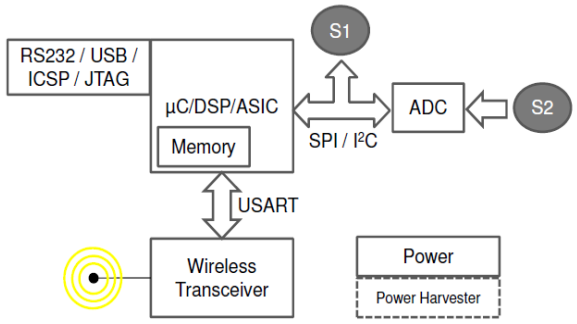

Fig.4 Architectural Design Flow framework

A simple Device: A device (senor) which is neither a PAN nor Coordinator. WSNs may consist of many different types of sensor. As a result, a wide range of applications are possible. A receiver might conclude error on receiving a packet, if the receiver is receiving a packet from a node and there is another transmission in the carrier sense range of a receiver (even though the packet is not intended for it). Note that the receiver concludes collision of all the packets that are intended for it. We propose a decentralized, hierarchical, cluster-based adaptive sampling framework for estimating a three-dimension scalar with multiple interacting manifestations of the phenomenon that vary both in time and space. The sensor partitioned into clusters of nodes sensing similar values within a given threshold. Such clusters are aggregated at various levels based on similarity of sensed data and these results in a hierarchy of clusters. The spatial correlation characteristics of the phenomenon are leveraged to achieve this. The clusters are modified to ensure membership consistency as the sensor readings change over time.

4. Conclusion

Technology and its trend to the field of networking and with advanced change in that aspect is vast and Networks of wired sensors have long been used in industrial fields such as industrial will have many more technical aspect of research and Development. Sensing and control applications, building automation, and access control. However, the cost associated with the deployment of wired sensors limits the applicability of these systems. Instead, WSNs are a promising alternative solution for these systems due to their ease of deployment, high granularity, and high accuracy provided through battery powered wireless communication units. In the above all , changing the most aspect in the field of IT, Hence we look forward though use the concept in the greater efficient and cost effective which would be more will stress to health care and its related vertical.

5. Future Work

In future wireless and electronic technologies are enabled a wide range of applications of wsns in military sensing, target tracking, environment monitoring, healthcare monitoring. Many number of WSN applications itself add the advanced features and various fields.

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Author Profile

Bhattu.Harikrishna*1, PhD
Scholar, Department of Informatics, OU, Tarnaka, Hyd, India