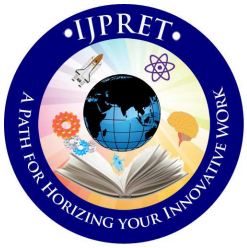
Research Article *ISSN: 2319-507X*
Priyanka Bhusari, IJPRET, 2013; Volume 1(8):522-528 *IJPRET*



INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK

DESIGN AND IMPLEMENTATION OF ENERGY EFFICIENT NOISE POLLUTION MONITORING SYSTEM USING WIRELESS SENSOR NETWORK

PRIYANKA BHUSARI, DR. G.M.ASUTKAR

Comm. Electronic dept.PIET, Nagpur

Accepted Date:

27/02/2013Publish Date:

01/04/2013

Keywords

Routing,

Scheduling,

Noise measurement,

Synchronized

Corresponding Author

Ms.Priyanka Bhusari

Abstract

This In this paper, the report of design and implementationofcommunication and networking part of wireless sensornetwork application for measuring environmental acousticnoise. In this paper propose architecture how to monitor anoise pollution through wireless sensor network. The networkis formed using tree topology and global synchronization isobtained. Transmission scheduling is implemented in this network because of noise monitoring is uninterruptable and time consuming. The various protocols are use to built this application. Wireless Sensor Networks are very challenging research field for automation embedded system design, which should enforce stringent constraints such as power and cost. Wireless Sensor Network is a fast growing technology having a number of potential applications in various domains of day to day life, such as structural andenvironmental monitoring, medical, military surveillance, Forestfires detection etc. WSN nodes are low power embedded devicesconsisting of processing and storage components combined withwireless RF transceiver and some sensors.network, environment monitoring.

INTRODUCTION

Noise can be defined as the level of sound which exceeds the good enough level and creates irritation. Numerous exposures to high level of noise cause severe stress on the acoustic and nervous system. Extensive exposure to extreme sound has been proved psychological and physical damage.

II. Harmful Effects of Noise Pollution On Human Beings:

1. It interferes with communication. If the noise is presence we may not able to communicate with other.

2.Noise leads to behavioral & emotional stress person feel disturbed in the presence of loud noise, etc.

III.Noise Measurement Instruments And Techniques

Noise measuring instrumentsnormally use a sensor to receive the noise signals emanating from a source. A sensor conversely, not just detects the noise from the resource, but also any ambient environment noise. Thus, detecting the value of the measured noise is inaccurate, since it includes the ambient surroundings noise. The traditional way of conducting noise measurements is inconvenient. A technician always to carry a Sound Level Meter (SLM) to a measuring location noise. The drawback of this method are given bellow:

1) A commercial SLM is expensive, making large-scale measurements very costly,

2) point-by-point measurements make the results incoherent time wise.

The loudness of a given noise source is therefore better represented by the average of the time-varying sound pressure level Lp(t) over a given period of time T:

$$L_{eq}=\frac{1}{T}\int_0^T 10^{\frac{L_{p(t)}}{10}}\,dt\ (dB)$$

The equivalent sound level pressure Leqdefined as the quantity that is typically measured by a sound level meter and that drives the computation of most commonly used noise indicators.

Wireless sensor network (WSN) which consists of number of signal processing devices called as nodes, each having finite battery lifetime and thus limited computing and communication capabilities. When these nodes are properly programmed and networked, nodes in a WSN should be cooperate to perform advanced signal processing tasks with robustness and

versatility, thus WSN is an attractive low-cost technology for a wide range of sensing and environmental monitoring applications . Wireless sensor node is built no. of nodes from one to a several hundreds or thousands.

The LEACH protocol is a protocol for forming clusters in a self-organized homogeneous sensor network when the base station is located far from the sensors. In LEACH some nodes are elected as cluster-heads while the other nodes communicate with the base-station through the nearest cluster-head. This protocol randomly rotates the job of cluster-head based on the node's remaining energy in order to uniformly distribute the energy consumption throughout the network. In this calculate the optimum average energy cost for transmitting data to base-station, when three types of nodes are randomly deployed in a large area. consider only random deployment of senor and aggregators nodes and find node densities as well as initial energy of aggregators and sensors such that total cost of allocating energy is minimized.

The easy concept of term noise is an avoidable sound and important form of energy, which is release by a vibrating body and on reaching the ear causes sensation of hearing through nervous system. The noise usually consists of three inter-connected fundamentals the source, receiver and transmission path followed by the noise to reach receiver. This transmission path is generally the atmosphere through which sound is propagated, however can include structural materials of any structure containing the receiver. Differentiation and discrimination between noise and sound also depends upon the pattern and interest of the person or species receiving it, the ambient situation and impact of the sound generated during that particular period of time. The noise is an redundant sound that may cause some psychological and physical stress to the living and non-living objects exposed to it. At nearby, noise pollution is measured as one of the key problems of urban communities that has several hazardous effects on the urban environment and may result in a great deal of costs on the humanity. The Environmental noise directive defined by

the European Union the noise pollution needs to be reduced or prevented in order to minimize harmful effects caused by the environmental noise. So, to minimize environmental noise the main prerequisite is the continuous monitoring of the noise throughout time in various locations that can be problematic in dense urban areas. Also, noise is a multimedia signal that needs to be appropriately processed and transmitted to the destination. In this paper propose a system capable of transferring noise data from large number of sensors by the means of Wireless Sensor Network (WSN). In various countries, environmental acoustic noise is regarded as a critical measured for living comfort and working. Recent it seen that if people are exposed to environmental noise levels that are very high, this increases the risks for hearing problems, hypertension heart diseases, and sleep disorders. The environmental noise is negatively affects productivity and that it is one of the major environmental problems. On the assessment of noise pollution in urban areas if the noise levels is exposed to85 dB, it means there is maximum amount of noise is present. In order to actuate exposures are at or above this level, it is necessary to monitor or measure the original noise levels in the area and to estimate the noise exposure. Noise monitoring or measuring must be conducted only when exposures are at or above 85 dB.A sink node.significant advantages:

1) Reduction of cost in both sensing devices and workload;

2)Real-time measurement, multi-point measurement, coherent measurement

3) The originality of this application is that it associate routing, scheduling, global synchronization under a single framework. Considered the Tmote Sky platform and sensors were deployed to measure noise. The large-scale noise measurement using a WSN solution is possible. However, the measurement accuracy are not mentioned, and the node calibration was left as an open issue in their work. The sampling rate is at 8kHz because of CPU/ADC limit, which does not cover the accurate acoustic frequency range.As stated that wireless sensor network is feasible for the use in environmental noise monitoring. It also evaluated three hardware platforms

and two data collection protocols. Their protocol comparison results showed that CTP (Collection Tree Protocol) with LPL (Low Power Listening) provides good performance in terms of energy efficiency compared to CTP and DMAC protocols. With multi-hop feature, the wireless noise measurement network is able to cover a huge area. System is much cheaper because of low cost design, decreasing installation cost. By selecting suitable duty cycles, the lifetime of the designed battery-powered measurement network can be extended to months.

The sensors are able to measure the acoustic noise continuously for a long period, generally for a whole weekend, and the cost of sensor nodes must be minimized.The network is able to support multi-hop tree topology so that a huge area can be covered. The network should cover several hundred square meters. In a network size this means that it has 2-3 clusters which each required 3 to 6 noise sensors. The sensors are able to measure the acoustic noise continuously for a long enough period ,generally for a complete weekend, and the cost of sensor nodes must be minimized. The most challenging feature of this application is the collection of large amount of noise data (72 bytes in every 5 seconds for all node in network) from the complete network, and delivering that to the sink node in a very less communication window. When noise is measure by a sensor node it has to turn off the radio transceiver.

The design issue is such that the sensor nodes near the SINKrelay data for the remote sensors. But it is found that it had a many scaling problem when the number of sensors increase. In order to overcome the burst traffic, the relay nodesare introduced for the remote sensors. Thus the WSN contains a SINK node, noise sensor nodes, and set of relay node. The network uses multi-hop tree topology with SINK as the root of the tree.

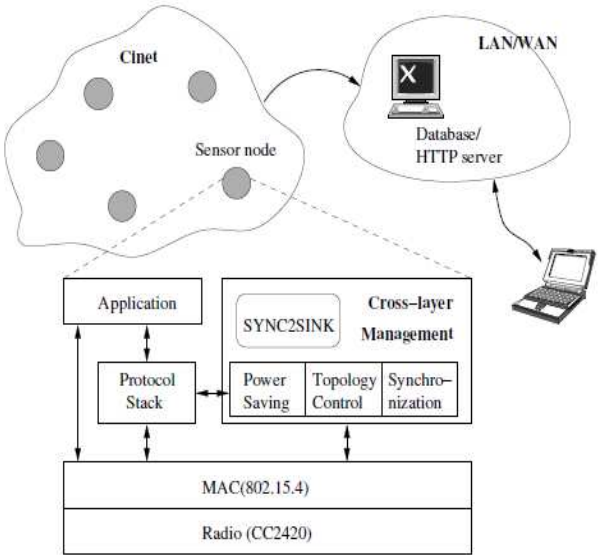


Figure 2. System and node architecture

The sensor nodes can be placed at various arbitrary locations in the area concerned. The role of relay nodes is to take care of relaying sensor packets to the sink. SYNC has four basic functions: Let the entire network become synchronized, Let the relay nodes set up a route back to SINK, Let the sensor nodes choose the finest relay node.

Inthis method an integrated synchronization and routing protocol such as SYNC2SINK to achieve the objectives. The SYNC2SINK protocol uses to enables the nodes for establish and maintain a route to the sink using the data contained in synchronization frames. SYNC2SINK protocol is design on the CiNet protocol stack which is cross layer architecture in which time; radio link state, battery and topology information are shared by sensing, packet transmission and reception, and route table maintenance. The architecture of CiNet can be seen in above Figure. In case of SYNC2SINK protocol the nodes are work periodically in 4 phases: a synchronization phase, a sensing phase, a data communication phase, and a optional sleep phase for energy saving. In this domain the noise measurement has to be done continuously so that the sleep phase is removed. Power efficiency is one of the most important designparameter for WSN nodes, and consequently a lot of efforts have been made to propose energyefficient implementations of such devices. To design an energy-awareWSN node, it is obligatory to analyze its power dissipationcharacteristics. Along with, computation and communication subsystems use bulk of the power budget and it is generally accepted that efforts toward energy reduction should target both of them in particular. Communication energy is concerned, there have been maximum efforts put on the

communication stack energy optimization and low power RF technology, including energy efficient routing algorithms, low power MAC protocols, efficient error correction codes and power-aware transmission techniques.

VI. CONCLUSION

As per explained above, Collecting accurate actual noise pollution data relying on the current measurement procedures is costly and cumbersome and does not scale with the demand for higher data granularity. Collecting fine-grained noise measurements through the manual collection clearly inefficient and expensive. In this paper report the design and implementation of a protocol suite for a WSN application which measures the instantaneous environmental acoustic noise in a given area. Noise monitoring is a fundamental requirement for improving the efficiency of the signal.

VII. REFERENCES

1. Hakala, I. Kivela, J. Ihalainen, J. Luomala, and C. Gao,"Design of Low-Cost Noise Measurement Sensor Network:Sensor Function Design," in Proc. of The First InternationalConference on Sensor Device Technologies and Applications(SENSORDEVICES 2010), July 2010.

2. S. Santini, B. Ostermaier, and A. Vitaletti, "First experiences using wireless sensor networks for noise pollution monitoring," in REALWSN '08: Proceedings of the workshop on Realworldwireless sensor networks. New York, NY, USA: ACM, 2008, pp. 61–65.

3. L. Filipponi, S. Santini, and A. Vitaletti, "Data collection in wireless sensor networks for noise pollution monitoring," Proceedings of the 4th IEEE/ACM International Conferenceon Distributed Computing in Sensor Systems (DCOSS'08)

4. IlkkaKivel¨a, Chao Gao, JariLuomala, IsmoHakala University Of Jyv¨askyl¨a" Design of Noise Measurement Sensor Network: Networking and Communication Part" SENSORCOMM 2011 : The Fifth International Conference on Sensor Technologies and Applications.