IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
Research paper UGC CARE Listed (Group -I) Journal Volume 12, Iss 1, 2023

Environmental Noise Sensor Identification System Using Wireless Sensor Networks of (MEMS) Technology

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Abstract:

This paper presents survey of different nodes of wireless sensor networks which has been made viable by sensing the noise of creature and transmits into the digital frequency. Using micro electro- mechanical systems (MEMS) technology, wireless communications and digital electronics. First, the sensing tasks and the potential sensor networks applications are explored, and a review of factors influencing the design of sensor networks is provided. And we also design the system to identify the creature and his location. Then, the communication architecture for sensor networks is outlined, and the algorithms and protocols developed for each layer in the literature are explored. Open research issues for the realization of sensor networks are also discussed.
Keywords: Wireless sensor networks; Micro-Electro Mechanical System; Differential Pulse Code Modulation (DPCM) Application layer; Transport layer; Networking layer; Routing; Data link layer; Medium access control; Error control; Physical layer; Power aware protocols

1. Introduction:

Some environmental applications of sensor networks include tracking the movements of birds, small animals, and insects; monitoring environmental conditions that affect crops and livestock; irrigation; macro instruments for large-scale Earth monitoring and planetary exploration; chemical/biological detection; precision agriculture; biological, Earth, and environmental monitoring in marine, soil, and atmospheric contexts; forest fire detection; meteorological or geophysical research; flood detection; bio-complexity mapping of the environment; and pollution study Forest fire detection: Since sensor nodes may be Strategically, randomly, and densely deployed in afforest, sensor nodes can relay the exact origin of the fire to the end users before the fire is spread uncontrollable. Millions of sensor nodes can be deployed and integrated using Radio frequencies/optical systems. Also, they may be equipped with effective power scavenging methods, such as

Solar cells, because the sensors may be left unattended for months and even years. The Sensor nodes will collaborate with each other to perform distributed sensing and overcome obstacles, such as trees and rocks that block wired sensors' line of sight.
The advances of technology in the remote Sensing and automated data collection has enabled higher spatial, spectral, and temporal resolution at a geometrically declining cost per unit area. Along with these advances, the sensor nodes also have the ability to connect with the Internet, which allows remote users to control, monitor and observe the biocomplexity of the environment.

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2.Literature review:

A wireless sensor network (WSN) has important applications such as remote environmental Monitoring and Have a wide range of potential have applications to industry, science, transportation, civil infrastructure, and security Habitat and Ecosystem Monitoring, Monitoring Groundwater Contaminate Rapid Emergency Response, Industrial Process Monitoring, Perimeter Security and Surveillance, Automated Building Climate Control.

Monitoring for Civilian Applications

- ***Health monitoring*:**
- ***Tracking applications:***
- ***Intelligent home environment:***
- ***Localization applications:***
- ***Monitoring the aquatic environment:***

***2.1 Health monitoring*:** WSN can be used as art of a health monitoring system that can be worn by the patient. Code Blue system developed at Harvard University exploits a WSN to raise an alert when vital signs fall outside of the normal parameters. The system monitors heart rate, oxygen saturation, data and relays the data over a short-range wireless network to a set of devices, including ambulance-based terminals.

2.2Tracking applications*:* Instead of sensing environmental data, sensor nodes are deployed to sense the presence of persons and objects. In the simplest case, objects can be tracked by tagging them with a small sensor node. The sensor node is tracked as it moves through a field of sensor nodes that are deployed in the environment at known Locations. The sensor nodes can be used as active tags that announce the presence of a device.

2.3 Intelligent home environment*:* The smart home can communicate with the environment and people through these of sensors and can act upon the environment through the use of actuators.

2.4 Localization applications*:*

For example, detecting and locating snipers is a challenging goal for armed forces and Law enforcement agencies. Most successful sniper detecting systems are based on exploiting a WSN that takes measurements of the acoustic events generated by a shot: the spherical wave (traveling at the speed of sound)produced by the muzzle blast and the shock wave generated by the supersonic projectile. By exploiting the measurements of acoustic events taken by the sensor network nodes, it is possible to determine the sniper's location and the bullet's trajectory.

2.5 Monitoring the aquatic environment:

The underwater wireless sensor network have applications including the scientific (e.g., oceanographic data collection for scientific exploration, pollution control, or climate monitoring),military (e.g., tactical surveillance), and civilian fields(e.g., tsunami warnings).

3. Related works:

3.1 Wireless sensor network (WSN) is recently considered as one of the most important Telecommunication technologies that proves its compatibility and reliability in many applications.(WSNs) have become emerging trends of the modern communication system. AWSN consists of a large number of tiny and low power sensor nodes, which are randomly or manually deployed across an unattended target area. Routing plays a vital role in the design of WSNs. Energy awareness is one of the vital parameters as the batteries used in sensor nodes cannot be recharged often.

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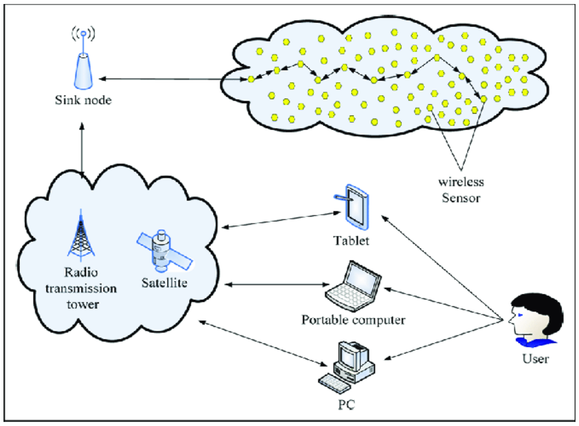

Fig:1 Wireless sensor network (WSN)

Dense self-deployment: WSN is a huge distributed computational system. Large number of sensors are scattered and densely randomly deployed in the network environment. Sensors are configured autonomously as each sensor independently manages its self communication in the network.· Limited processing and storage: Sensor nodes are small battery powered autonomous physical devices that highly limited in, computational capabilities and storage capacity. Limited energy resources: Due to the tough nature of WSN applications environment and the fact that sensor nodes are battery powered devices, it is usually hard to change or recharge theses batteries.

3.2 The Advanced System of (WSN):

Wireless Sensor Networks (WSNs) are these days advanced to support lots of applications, which include site visitors manipulate, home automation, clever battlefield, environment monitoring and many more. WSN consists of various sensors which can be disbursed around a particular node for attaining the computational operations In WSN, routing is a completely important mission this is to be treated carefully. Routing approach is needed for sending the records among the sensor nodes and the base stations, with the intention to set up verbal exchange. The major criterion that is centered in this paper is about the routing protocol that varies based on the application. The routing problem leads to reduced community lifetime with improved power consumption. So, numerous routing protocols had been evolved to limit the energy intake and to maximize the community lifetime. The routing protocols may be classified primarily based on the nodes' participation, clustering protocols, mode of functioning and network shape.

3.3 Future Opportunities:

The challenges which can be addressed in the present routing algorithms can be rectified by means of the use of soft computing and computational intelligence. The future opportunities can be as follows.

1. Design and programs: Wireless sensor networks are carried out in lots of regions, which encompass monitoring of the organic machine with tissue-implanted sensors and monitoring forest hearth with air-dropped sensors. The sensor nodes need to be in precise function for a few packages and some don't need the nodes to be unique. So, it's far critical to design the type, location and the wide variety of sensor nodes for future packages.
2. Sensor localization: Sensor localization refers back to the creation of area consciousness in all of the sensor nodes that are deployed at a specific point. Geometric-conscious routing may be used to reap correct information. Also, the localization methods that utilize the time-of-arrival of the alerts from the bottom stations are used in WSNs.
3. Routing based on strength focus: Maximizing the community lifetime in WSN is a chief factor, which is to be paid attention. Frequent recharging of the nodes isn't possible because of its price. For a few

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applications, the community lifestyles expectancy of numerous years is wanted. Routing includes the retrieval of the path of a message, which is communicated from a supply node in the direction of a vacation spot node. Among the 2 styles of routing techniques, the proactive Routing strategies contain table era and keep the routes without any route matching. But, within the reactive routing methods, the routes are subjected to computation. In addition, the hybrid of each the routing method is carried out within the densely deployed networks to keep away from massive memory intake of the routing tables. The memory usage can be reduced by community clustering to.

4. MEMS Technology:

Recent advances in micro-electro-mechanical systems (MEMS) technology, wireless communications, and digital electronics have **to be converted Noise into Digital Frequency of multi sensor system**. enabled the development of low-cost, low-power, multifunctional sensor nodes that are small in size and communicate Unmetered in short distances.

These tiny sensor nodes, which consist of sensing, data processing, and communicating components, leverage the idea of sensor networks based on collaborative effort of a large number of nodes. Sensor networks represent a significant improvement over traditional sensors, which are deployed in the following two ways .Sensors can be positioned far from the actual phenomenon, i.e., something known by sense perception. In this approach, large sensors that use some complex techniques to distinguish the targets from environmental noise are required.

Several sensors that perform only sensing can be deployed. The positions of the sensors and communications topology are carefully engineered. They transmit time series of the sensed phenomenon to the central nodes where computations are performed and data are fused.

The position of sensor nodes need not be engineered or pre-determined. This allows random deployment in inaccessible terrains or disaster relief operations. On the other hand, this also means that sensor network protocols and algorithms must possess self-organizing capabilities. Another unique feature of sensor networks is the cooperative effort of sensor nodes. Sensor nodes are fitted with an on-board processor. Instead of sending the raw data to the nodes responsible for the fusion, sensor nodes use their processing abilities to locally carry out simple computations and transmit only the required and partially processed data.
The above described features ensure a wide Range of applications for sensor networks. Some of the application areas are health, military, and security. For example, the physiological data about a patient can be monitored remotely by a doctor. While this is more convenient for the patient, it also allows the doctor to better understand the patient's current condition. Sensor networks can also be used to detect foreign chemical agents in the air and the water. They can help to identify the type, concentration, and location of pollutants. In essence, sensor networks will provide the end user with intelligence and a better understanding of the environment. We envision that, in future, wireless sensor networks will be an integral part of outlives, more so than the present-day personal computers. Realization of these and other sensor network applications require wireless ad hoc networking techniques. Although many protocols and algorithms have been proposed for traditional wireless ad hoc networks, they are not well suited for the unique features

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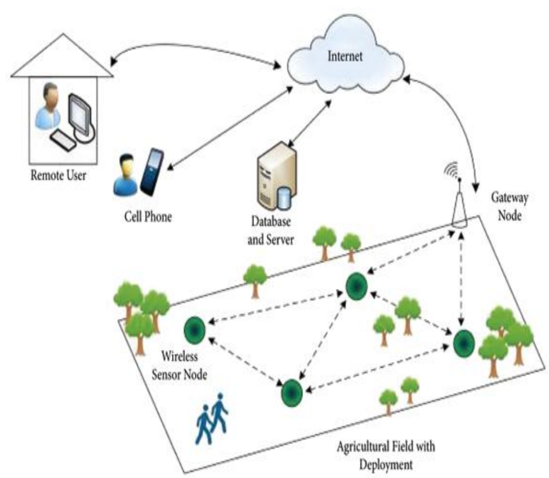
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 1, 2023

and application requirements of sensor networks.

5. Problem statement:

Tracking and monitoring soldiers and Army official son the battlefield: Each soldier has small and light weight sensor nodes attached to them. Each sensor node has its specific task. For example, one sensor node may be detecting the noise while another is detecting the location. Officials may also carry a sensor node, which allows other officials to locate them within the battlefield



5.1. Compress and Transmit

To further reduce data capacity, the recording data is compressed before transmission. An effective way to compress audio data is using the Differential Pulse Code Modulation (DPCM) that encodes the analog audio input signal using the difference between the current and the previous sample. The difference can be large or small because the sound signal is random. To accommodate it, ADPCM is more applicable . In this work, we implemented the ADPCM on the embedded processing board. The influence of compression with ADPCM on audio quality and recognition will be reported in later chapters. After compression, a packet including audio, noise level, triggered time of recording, Coordinates, and device number is transferred to the server through the 4 G wireless module.

5.2. Receive and Storage

Whenever the server receives a packet, it decompresses the packet to the appointed path of

Storage to get the original data. the triggered time (Time), the location of the node (Cords), the identification code of the node device (IMEI), and the noise level (Decibel) are stored in server for efficient management. Especially, the GPS devices submit data in the form of sentences, which are defined by the NMEA-0183 protocol. There are lots of sentences in the NMEA protocol and it is infeasible to save the whole emitted information in a database, therefore we are going to deal with only the $GPRMC sentence, which contains the necessary minimum information for location purposes, as can be seen in Appendix A. After obtaining the coordinates of latitude and longitude which can be extracted from the $GPRMC sentence, we can convert the coordinates to the corresponding map coordinates by calling the API interface of Bitmap. Finally, we save the map coordinates in a direct call in the monitoring platform. The monitoring platform automatically accesses these data to update the information displayed on the platform

5.3Monitoring Platform:

We design a monitoring platform for environmental noise and sound events, including noise map, environmental sound event information, and noise statistics. For the noise map, we use different color circles to represent the noise levels of sensor nodes, so that we can intuitively understand the noise situation of the monitoring areas. The noise map is updated automatically with the environmental condition changes. For the

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sound event information, when the sound event occurs, which can be detected by sensor nodes, the corresponding landmarks will throb briefly on the map, and the information including location, event, and time will be recorded and displayed. For the noise statistics, we show the noise variation of the monitoring area in a day. We can choose different monitoring areas to view the corresponding variation of noise. All the above data can be reviewed by selecting the date and time.

5.4. Results and Analysis

We conduct experiments in two steps to evaluate the performance of the proposed system. First, we evaluate the performance of the sensor node, mainly related to sound acquisition and recording. Second, we evaluate the performance of the proposed system based on WSN that consists of 50 sensor nodes, mainly related to Monitoring and Locating the Accurate Ares.

6. CONCLUSION AND FUTURE WORK:

Finally we conclude the literature survey,WSN are a widely applicable, major emerging technology. They bring a whole host of novel research challenges pertaining to energy efficiency, robustness, scalability, self-configuration, etc.WSNs have potential applications in environment monitoring, disaster warning systems, health care, defense reconnaissance, and surveillance systems. However, the main constraint of the WSNs is the limited power sources of the sensor are detecting and noise and find out the location and rang.

In Feature the most challenging issue for the long run operation of WSNs .The flexibility, fault tolerance, high sensing fidelity, low-cost and rapid deployment characteristics of sensor networks create many new and exciting application areas for remote sensing. In the future, this wide range of application areas will make sensor networks an integral part of our lives. However, realization of sensor networks needs to satisfy the constraints introduced by factors such as fault tolerance, scalability, cost, hardware, topology change, environment and power consumption in feature.

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