Study of Wireless sensor network

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ABSTRACT

As wireless sensor technology improves; an increasing number of organizations are using it for a wide range of purpose, Wireless Sensor Networks (WSN) are used in variety of fields which includes military, healthcare, environmental, biological, home and other commercial applications. With the huge advancement in the field of embedded computer and sensor technology, Wireless Sensor Networks (WSN), this is composed of several thousands of sensor nodes which are capable of sensing, and relaying the collected information, have made remarkable impact everywhere. This paper presents an overview of the various research issues in WSN based applications.

Keywords:

Wireless sensor network, task mapping, smart parking, Event detection, Bluetooth, greenhouse monitoring, health Care.

II. INTRODUCTION

Wireless sensor networks (WSNs) are an important technology for large-scale monitoring, providing sensor measurements at high temporal and spatial resolution. The simplest applications is sample and send where measurements are relayed to a base station, WSNs can also perform in-network processing operations such as aggregation, event detection, or actuation.

This wireless sensor networks is depends on a simple equation: Sensing + CPU + Radio = Thousands of possible applications. A wireless sensor network is type of wireless network. It is small and infrastructure less .basically wireless sensor network consist a number of sensor node, called tiny device and these are working together to detect a region to take data about the environment. Wireless sensor network has two types: structured and unstructured. if we talk about unstructured so is a collection of sensor nodes. And these deployed in adhoc manner into a region. Once deployed, the network is absent unattended perform monitoring and reporting functions. In other structured wireless sensor network, the all sensor nodes are deployed in pre designed manner. The benefit of structure wireless sensor network is that some nodes can be deployed with lower network maintenance and management cost. Fewer nodes can be deployed now since nodes are placed at specific locations to provide coverage while ad hoc deployment can have uncovered regions. Wireless sensor network aim is to provide efficient connection among the physical environmental condition and internet worlds. The sensor nodes of the wireless sensor network is allows random deployment in inaccessible terrains, this means protocol of the wireless sensor is self organized, another important feature of the wireless sensor network is cooperative effort of the sensor nodes. Sensor nodes are collecting data about environment, after collecting it they process it and then transmit to the base station. Base station provides a interface between user and internet. Basic characteristic of the wireless sensor network are limited energy, dynamic network topology, lower power, node failure and mobility of the nodes, short-range broadcast communication and multi-hop routing and large scale of deployment. In the wireless sensor network architecture includes both a hardware platform and an operating system designed. TinyOS is a component based operating system designed to run in resource constrained wireless devices. It provides highly well-organized communication primitives and fine grained concurrency mechanisms to application and protocol developers. Basically TinyOS is the use of event based programming in conjunction with a highly efficient component model. TinyOS enables system-wide optimization by providing a tight coupling among hardware and software. TinyOS has been designed to run on a generalized architecture where a single CPU is shared between application and protocol processing. Figure 1 show the basic architecture of the wireless sensor network in which sensor node deployed in the sensor fields and they communicate with each other for collect the information from the environment, or directly send to the base station basically base station act as a gateway. With the help of gateway data is transmitting to the internet. Because user is directly connect to the internet.

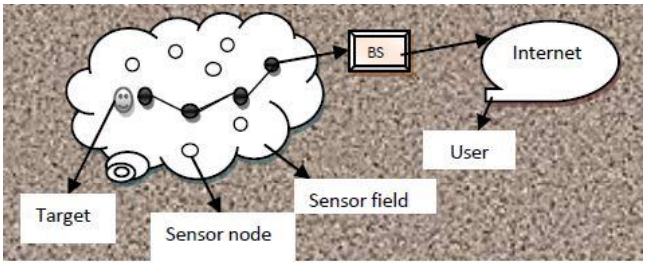


Figure 1 Architecture of the Wireless Sensor network

Wireless multimedia sensor networks will not only enhance existing sensor network applications such as tracking, home automation, and environmental monitoring, but they will also enable several new applications such as:

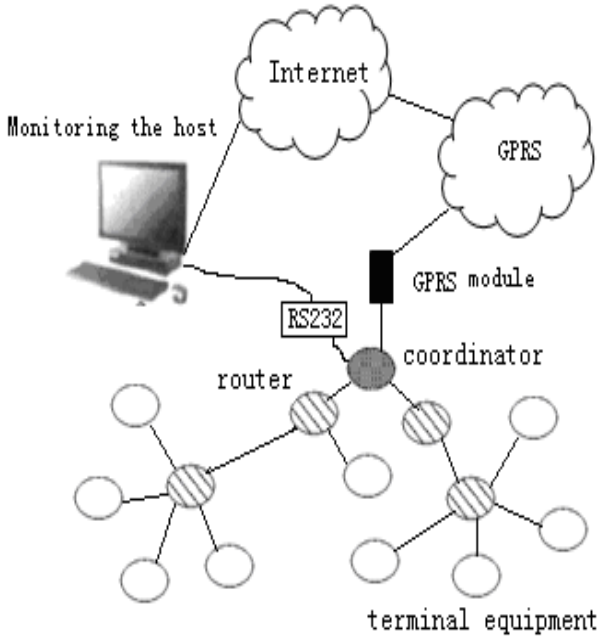
[1] Multimedia surveillance sensor networks. Wireless video sensor networks will be composed of interconnected, battery-powered miniature video cameras, each packaged with a low-power wireless transceiver that is capable of processing, sending, and receiving data.
[2] Storage of potentially relevant activities. Multimedia sensors could infer and record potentially relevant activities (thefts, car accidents, traffic violations), and make video/audio streams or reports available for future query.

[3] Traffic avoidance, enforcement and control systems. It will be possible to monitor car traffic in big cities or highways and deploy services that offer traffic routing advice to avoid congestion. In addition, smart parking advice systems based on WMSNs will allow monitoring available parking spaces and provide drivers with automated parking advice, thus improving mobility in urban areas. Moreover, multimedia sensors may monitor the flow of vehicular traffic on highways and retrieve information such as average speed and number of cars. Sensors could also detect violations and transmit video streams to law enforcement agencies to identify the violator, or buffer images and streams in case of accidents for subsequent accident scene analysis.

[4] Advanced health care delivery. Telemedicine sensor networks can be integrated with 3G multimedia networks to provide ubiquitous health care services. Patients will carry medical sensors to monitor parameters such as body temperature, blood pressure, pulse oximetry, ECG, breathing activity.

[5] Environmental monitoring.in which information has to be conveyed in a time-critical fashion. For example, arrays of video sensors are already used by oceanographers to determine the evolution of sandbars via image processing techniques.

[6] Person locator services. Multimedia content such as video streams and still images, along with advanced signal processing techniques, can be used to locate missing persons, or identify criminals or terrorists.



Keywords and Synonyms:-

Keywords	**Synonym**
WSN	Wireless sensor network
WSN	Wireless sensor network protocols
SNS	Sensor network services
SND	Sensor network deployment
Survey	Review and Issues

Analysis
Few analytical results exist for WSN. Since WSN are in the early stage of development it is not surprising that few analytical results exist. Researchers are busy inventing new protocols and new applications for WSN. The solutions are built, tested and evaluated either by simulation or test beds; sometimes an actual system has been deployed. Empirical evidence is beginning to accumulate. However, a more scientific approach is required where a system can be designed and analyzed before it is deployed. The analysis needs to provide confidence that the system will meet its requirements and to indicate the efficiency and performance of the system. Consider the following interesting analysis questions.

1. What density of nodes is required to meet the lifetime requirements of the system?
2. What sensing and communication ranges are needed to detect, classify and report a target to a
base station by a deadline?
3. What sensing range and what nodes need to be awake in order to guarantee a certain degree of sensing coverage for a system?
4. Given n streams of periodic sensing traffic characterized by a start time, period, message size, deadline, source location and destination location for a given WSN will all the traffic meet their deadlines?

HOW WIRELESS SENSOR NETWORKS WORKS

Wireless sensor networks is collection of the small tiny device called sensor nodes. It may be small and large. That's why construct the wireless sensor network is based on sensor nodes. So entire working of sensor network is depending on sensor nodes. These nodes are varying in size and totally depend on this because different sizes of sensor nodes work efficiently in different fields. Wireless sensor networking have such sensor nodes which are especially designed in such a typical way that they have a microcontroller which controls the monitoring, a radio transceiver for generating radio waves, different type of wireless communicating devices and also ready with an energy source like battery. The entire network worked simultaneously by using different dimensions of sensors and worked on the phenomenon of multi routing algorithm which is also termed as wireless ad hoc networking.

WIRELESS SENSOR NODE ARCHITECTURE

For better understanding of sensor network it is important to know about all the components of sensor node. Common sensor node architecture is shown in Figure2. The architecture of a generic wireless sensor node consists of four subsystems [5]. A computing subsystem consisting of a microprocessor, ALU and memory, a communication subsystem consisting of a short range radio for wireless communication, sensing subsystem that links the node to the physical world and consists of a group of sensors and actuators, and a power supply subsystem, which houses the battery and the (optional) DC-DC converter, and powers the rest of the node. Each subsystem plays an main role in the sensor node.

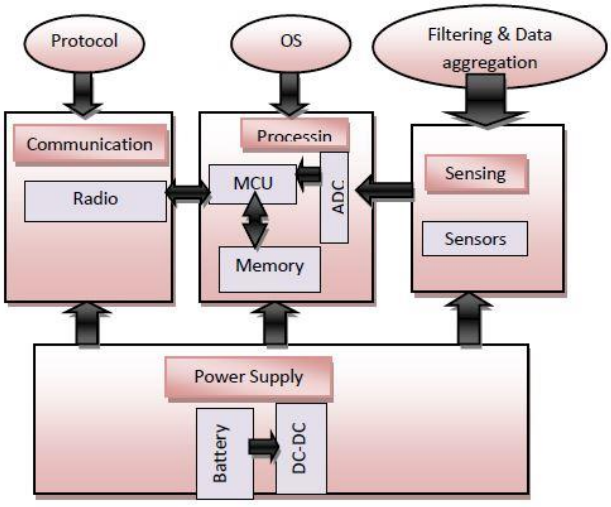


Figure 2 Sensor Node System

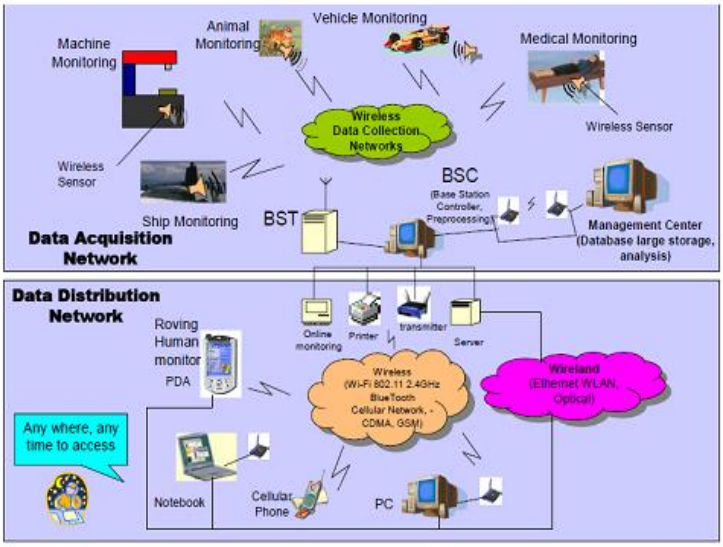
Research Questions

Novel network protocols that account for the key realities in wireless communication are required. New research is needed to:

1.Measure and assess how the theoretical properties of wireless communication are exhibited in today's and tomorrow's sensing and communication devices,

2.Establish better models of communication realities to feed back into improved simulation tools,

3.Invent new network protocols that account for the communication realities of real world environments,



Threats to Validity

The research papers were obtained by keyword searching and reference analysis. Exclusions were made by reading the title, abstract and conclusions. However, there is a possibility that there exist papers that were missed due to the above searching and exclusion method.

III. CONCLUSION

In this brief note six key research areas were highlighted. However, many other research areas are very important including: localization, topology control, dependability, self calibration, self healing, data aggregation, group management, clock synchronization, query processing, sensor processing and fusion under limited capacities, and testing and debugging. WSN are a fascinating area with great potential. The impact of this area on the world can rival the impact that the Internet has had. Exciting and difficult research challenges lie ahead before this becomes reality. An overview of the broad spectrum of applications of WSN has been given in this paper. The application of WSN in the areas of biomedical, intelligent parking, healthcare applications, and environmental, industrial, and military applications have been briefed. These interesting applications are possible due to the flexibility, fault tolerance, low cost and rapid deployment characteristics of sensor networks. As a new wireless protocol in personal area, and low power consumption which corresponds to a large market. Though wireless sensor networks are constrained by scalability, cost, topology change and power consumption, new technologies are being devised to overcome these and to make sensor networks an integral part of our lives. A review on the various research issues involved in the WSN Applications has been outlined. Research on these issues will lead to promising results, making WSN based applications very popular. The

application of WSNs is not limited to the areas mentioned in this paper. The future prospects of WSN applications are highly promising to revolutionize our everyday lives. 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. Since these constraints are highly stringent and specific for sensor networks, new wireless ad hoc networking techniques are required.

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