Technological Innovations in Wireless Sensor Networks

E.Nivetha[1], P.Swarnalakshmi[2], L.Megala[3]

U.G.Student, Department of ECE, V.R.S. College of Engineering & Technology, Arasur, Villupuram, Tamilnadu, India [1]

U.G.Student, Department of ECE, V.R.S. College of Engineering & Technology, Arasur, Villupuram, Tamilnadu, India [2]

Assistant Professor, Department of ECE, V.R.S. College of Engineering & Technology, Arasur, Villupuram, Tamilnadu, India [3]

Abstract: The Technological innovations of wireless sensor network are highly promising to revolutionize our everyday lives. WSNs are used in variety of field such as biomedical, intelligent, parking, health care applications, environmental, industrial and military application. WSN consists of several thousands of several nodes and it is capable of sensing, actuating, and relaying collected information. This paper presents about various technological innovation in wireless sensor network

Keywords: WSN, smart parking, green house monitoring, habitat surveillance, reconnaissance and targeting systems.

I. INTRODUCTION

The feature of WSNs is that the sensor nodes have an in-build processor using which raw data are processor before transmission a sensor consist of sensing processing and communicating which helps the base *station* are command nodes to access and it react according to the condition in a specific environment sensor network protocols have a different self –organizing capacity. This feature is helps wide range of application of WSNs ranging from biomedical, environmental, military event detection and vehicular telemetries. This presents detailed information of technological innovations in the application of wireless sensor networks.

II. WSN IN HEALTH CARE APPLICATIONS

A WSN based prototype sensor networks for monitoring of health with sensors for heart activity. A WSN based home healthcare application is developed in 2008.WSNs are very efficient in supporting various current applications WSN based technologies have revolutionized home and healthcare applications. The recent developments in the applications of WSN in healthcare are being are presented. An important research on the perceptions and acceptance of elderly persons according to the usage of WSN.

The main research problem to be addressed is to enhance the degree of awareness of home assistants, caregivers, primary healthcare centres, to understand the patients' health and activity status to quickly discern and decide on the required action. The main issue that was concerned in this research is the development of a working model of home healthcare monitoring system with efficient power, reliability and bandwidth a light weight, low cost WSN based home healthcare monitor has been developed in 2008.this paper also explain about the hardware and software organisation of the presented system and gives solutions for synchronisation of time, management of power and on chip signal processing. Particular advantages and new applications of the technology can be determined by in-depth study of different medical conditions in clinical and ambulatory settings.

Physiological parameters of patients can be monitored by physicians and caretakers without affecting the patients' activities. This resulted in reduction of cost improvement of equipments and good patients reaping large commercial benefits. This technologies have importantly minimized human mistakes, allowed better understanding into origin of diseases and has helped in devising methods for rehabilitation, recovery and the effect of drug treatment. The implementation and analysis of a WSN based e-health application has been described. The issues' recording its implementation has been discussed.

The refence presents the micro subscription management system middleware, using and event based service model. This novel approach means the design constraints of limited resources, efficiency, scalability, dependability and low power consumption by implementing a dynamic memory kernel and a mechanism of variable payload multiplexing to provide better services. Y.D.lee and W.Y.Chung developed a smart shirt which measured ECG and acceleration signals. It is made up of contacting fabrics to obtain the body signals.

III. WSN IN COMMERCIAL APPLICATIONS

The commercial applications of WSNs include smart parking, structural health monitoring, and security of intra-car.

1. Smart Parking

A WSN based Smart Park in management system should be made fault tolerant, by incorporating mechanisms for identifying defaulters. Monitoring of remote parking, mechanism for parking reservation and automated guidance are the features of this system. WSNs are broadly are used in the applications like intelligent parking for the purposes such as effective usage of existing parking lots instead of making expensive investments in new installation. The factor affects the application of magnetometers and video cameras. The detection of magnetometers is not accurate as they are influenced by environmental factors. The alternate one is video camera which is feasible to transmit large amount of information in a wireless environment through multiple detection of vehicles in a parking lot.

2. Structural health monitoring

The process of reduction of damage for civil, aerospace and other system is referred to as structural health monitoring long term, online SHM based information processing are the applications based on WSN. Any change in the material or geometric properties of the system due to internal factors and external factors. This is termed damage. Rigid permanent bandwidth requirements, extended network life time and limiting multi hope data exchange are the challenges involved in WSN. However, critical events such as earthquakes and other natural disasters, real time rapid structural conditional screening can be done SHM system.
In condition to away with the limitation of traditional sensing networks, both the power and information are transmitted through a mobile agent, which sent to each sensor node. The construction of WSN and Global Poisoning system for SHM application has been presented.

3. Security of Intra-car

In this Security of Intra-car selection of appropriate security algorithms for WSNs using a systematic methodology and determination of the best combination with regard to execution time and security has been presented. By replacing wired sensors and their cable with wireless sensors, fuel efficiency and reduction in the reduction in the weight of automotives can be achieved.

4. Even detection

Tracking is a major characteristic of wireless sensor network especially for tracking of evens even proto call collaborative event detection, for event detection and tracking in wireless heterogeneous sensor networks has been presented.

IV. WSN IN INDUSTRIAL APPLICATIONS

In this generation, industrial applications are build on architectures and they are required to be inexpensive, flexible and dependable. The major application of WSN for safety monitoring of coal mines has been found. The evaluation of energy usage, condition monitoring, diagnosis and supervisory control for electric systems with Dynamic Power management which are based under WSN digital system have been presented. A WSN based approach is developed for detection of faults in metal cutting process. The machine tools can be maintained in proper condition and the occurrence of wearing of tool can be reduced by an appropriate monitoring systems.

The system's performance can be enhanced by interfacing sensors and actuators directly to the industrial communication network. A detailed survey on the latest development in WSN based industrial applications. A Dynamic Power Management protocol is implemented by sensor nodes, to extend the WSN lifetime. WSN based real-time and distant energy and fault diagnosis in industrial motor system has been presented. The motor signature analysis based electrical signal has been integrated with WSNs for getting good results.

A WSN based system for measuring and monitoring water quality is presented. Underwater acoustic sensor networks that can be used in deep waters is an area yet to be addressed. Automatic meter reading system is based on WSN is presented. The new advanced technology like wireless RF, Zigbee modules and code division multiple access telecommunications are used in the remote metering technology. In order to transmit the usage of parameters like electricity, gas, water etc. is not possible. Hence, the answer is provided by WSN based remote meters. It changes the way company's organizations and individuals monitor water, gas and other resources.

V. WSN IN BIOLOGICAL APPLICATIONS

Some of the biological applications such as biomedical signal monitoring, biological task mapping.

1. Biomedical signal monitoring

In the field of medicine, biomedical signal monitoring used in many ways. The features of WSNs have significantly developed in this field.
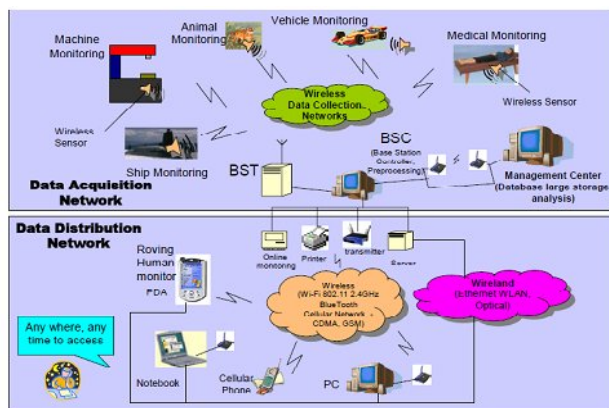

Fig.1 Cross section of the completed device

The basic principle and needed at the time of development of a functional model for the monitoring of biological signals to improve modern advanced equipments for monitoring patients in remote are using wireless technologies, the network topology, sensors specific signal reception and analysis has been considered. Telemedicine is the field which includes the treatment and care of patients from a distance and also aids in biomedical diagnosis.

2. Biological Task mapping

WSNs has broad applications in the place of biological sensing particularly, there is some recent research going on the theme of "labs on a chip", supported by latest technologies like Nano techniques. The use of WSNs has been accelerated due to advancements in Micro Electro-Mechanical Systems, microcontrollers and various wireless communication systems. Task mapping and the order of execution of the tasks is known as task mapping. The order of execution of the task is known as task scheduling. Both task mapping and task scheduling are of more significant in high performance computing.

VI. WSN IN MILITARY APPLICATIONS

WSNs play an important role in military command, control, communication, computing, intelligence, surveillance, reconnaissance and targeting system. Few challenges faced by WSNs on the battlefield are addressed. In the battlefield, the WSNs are prone to the attacks, where either the data or corrupting control.

A devices are attacked, leading to large amount of energy consumption and finally to the exit of nodes from work. The energy efficiency of sensor nodes and the correct modelling of energy consumption are the research issues yet to be explored.

WSN based collaborative target detection with reactive mobility has been presented. A sensor movement scheduling algorithm was developed and its effectiveness was proved using extensive simulations. WSNs have found application in very critical applications such as object detection and tracking. These applications require high detection probability, low false alarm rate and bounded detection delay.

CONCLUSION

As a result, even though wireless sensor network are constrained by scalability, cost, topology change and power consumption, new technologies are being devised to face these and to make sensor networks an integral part of our lives .thus the broad application of WSN has been explained in this paper. The application of WSN in the areas of biomedical, intelligent parking, healthcare applications, and industrial applications, environmental, industrial, and military applications has been explained.

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BIOGRAPHY

E. Nivetha is a U.G student in Electronics & Communication Engineering in V.R.S. College of engineering & Technology, Arasur, Villupuram District. My area of interest is Signal processing.

P.Swarnalakshmi is a U.G student in Electronics & Communication Engineering in V.R.S. College of engineering & Technology, Arasur, Villupuram District. My area of interest is Digital design.

Ms.L.Megala is an Assistant professor of ECE in V.R.S college of Engineering & Technology. She completed her B.E/ECE in Idhaya Engineering College for women, Chinnasalem in the year 2008. She completed her M.E in the field of Applied Electronics in S.K.P Engineering College, Thiruvannamalai the year 2011. She has attended 6 national conferences and 2 international conferences. She is the life time member of ISTE. She has a teaching experience of 5 years. At present, she is going to have a research work in the field of VLSI Design.