

A Literature Survey on Wireless Sensor Networks

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Abstract

Wireless sensor networks are networks of compact micro sensors with wireless Communication capability. These small devices are relatively cheap with the potential to be disseminated in large quantities. Emerging applications of data gathering range from the environmental to the military. As autonomous devices they can provide pervasive distributed and collaborative network of computer nodes. Architectural challenges are posed for designer such as computational power, energy consumption, energy sources, communication channels and sensing capabilities. Embedded Systems provide the computational platform for hardware and software components to interact with the environment and other nodes. This survey presents the current state-of-the-art for wireless sensor nodes, investigating and analyzing these challenges. We discuss the Characteristics and requirements for a sensor node mainly processing, communications, power and sensing components. In this survey we present a comprehensive comparative study of sensor nodes platforms, energy management

techniques, off the- shelf microcontrollers, battery types and radio devices.[1]

Keywords – WSN, Architecture, Components.

Introduction

Sensor hubs offer a ground-breaking blend of circulated detecting, computing and correspondence. The regularly expanding capacities of these tiny sensor hubs, which incorporate detecting, information handling, and communicating, enable the acknowledgment of WSNs dependent on the shared exertion of a number of other sensor hubs. They empower a wide scope of uses and, at the same time, offer various difficulties because of their quirks, essentially the stringent vitality imperatives to which detecting hubs are ordinarily subjected. As shown in Figure 1.1, WSNs consolidate learning and technologies from three unique fields; Wireless interchanges, Networking and systems and Control hypothesis. So as to understand the current and potential applications for WSNs, advanced and amazingly productive communication protocols are required. This section gives a first prologue to the WSNs, including engineering, explicit qualities and applications.

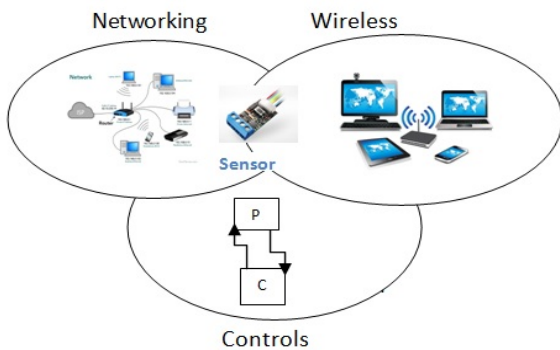


Figure 1.1

Remote sensor networks (WSN) are an ongoing examination point. This system is made out of hundreds or thousands of self-ruling and conservative gadgets called sensor hubs. The accessibility of incorporated low-control detecting gadgets, inserted processors, correspondence packs, and power hardware is empowering the structure of sensor hubs. Sensor Network has the potential for some applications: for example for military reason, it tends to be used for checking, following and observation of fringes; in industry for production line instrumentation; in a huge city to screen traffic thickness and street conditions; in designing to screen structures; in condition to screen timberland, seas, exactness horticulture, and so on. Other applications incorporate overseeing complex physical frameworks like plane wings and complex biological systems.

A sensor node is composed of a power unit, processing unit, sensing unit, and communication unit. The processing unit is responsible to collect and process signals captured from sensors and transmit them to the network. Sensors are devices that

produce a measurable response to a change in a physical condition like temperature and pressure. The wireless communication channel provides a medium to transfer signals from sensors to exterior world or a computer network, and also a mechanism of communication to establish and maintenance of WSN, which is usually ad-hoc.

Components of Wireless Sensor Node

The main components of wireless sensor network are given below.

A detecting unit

The detecting unit contains the principle segment of the hub. It will have the application explicit sensor. On the off chance that the application is for temperature observing, a thermistor will be going about as detecting unit. As indicated by the application, the detecting gadget will change.[3]

A handling unit

A programmable microcontroller goes about as a handling unit. The preparing unit controls the whole hub tasks by sending control directions to the relating gadget. The microcontroller can be chosen from scope of producers like Atmel, Microchip, Siemens, Texas instruments are a portion of the market chiefs.[3]

A handset unit

A handset is a gadget, performing both the task of a transmitter and a beneficiary, in a solitary lodging or offers a typical circuit.[3]

A power unit

The Power unit offers life to the sensor hub. This unit obliges a battery, usually with battery-powered choice. Progression in power unit can prompt sun oriented charging, as referenced prior. A long life control reinforcement with savvy control mindful, which empowers reviving consequently by sunlight based and furthermore with ordinary electrical plug. This will support the utilization of sensor organize in a huge application. This is the need of great importance.[3]

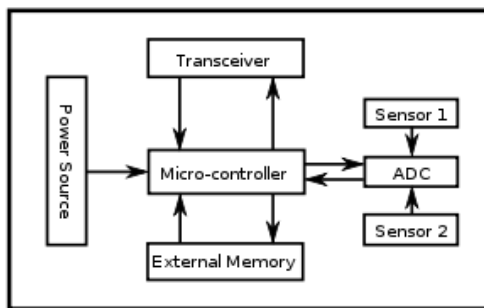


Figure 2.1

Applications of WSN

Human services Monitoring:

In the framework, sensor systems for restorative applications can be of a few sorts they are embedded, wearable, and condition - installed. The embedded capable restorative gadgets utilized on inside the human body. We arable gadgets are utilized on the body surface of a human. The applications incorporate body position estimation an area of per children, over all observing of sick patient s in medical clinics and at homes.[5]

Ecological/Earth Sensing:

The condition a l sensor is chiefly utilized for recognizing the Forest flame

recognition, Air contamination checking, avalanche discovery, water quality observing, and cataclysmic event aversion. Woods fire identification is utilized to identify fire in the backwoods through the sensor hubs. Air contamination observing is to screen the grouping of perilous gases for residents in a few urban areas. Avalanche location distinguishes the slight developments of soil and changes in different parameters that may happen previously or amid an avalanche. Water quality checking is accustomed to breaking down water properties in dams, waterways, lakes, seas just as underground water hold s. Catastrophic event forestall particle is a demonstration to counteract the result s of floods.[5]

Modern Monitoring

The modern observing is accustomed to detecting the machine wellbeing checking, squander water observing, server farm checking, auxiliary wellbeing checking. The machine wellbeing observing sensor systems have been produced for hardware condition - based support as cost reserve funds and empower new proposition. The waste water observing the quality and dimension of water incorporates numerous exercises, for example, checking the nature of underground surface water and guaranteeing a nation's water framework to help both human and creature. It might be utilized to ensure the waste time of water. The Data focus observing because of the high thickness of servers racks in a server farm, regularly cabling and IP locations are an issue. The basic wellbeing checking can

be utilized to watch the state of common framework and interfaced to geophysical procedures near continuous and over extensive stretches through information logging, utilizing properly entomb confronted sensors.[5]

Region Monitoring

Region observing is a typical utilization of WSNs. In zone observing, the WSN over an area where some wonder is to be checked. The region screen sensors recognize foe interruption and geo fencing of gas or oil pipelines.[5]



Figure 3.1

Routing Challenges and Design Issues in WSNs

Various research issues and challenges pertaining to WSNs that have been experienced by the researchers are presented in this work. Sensor networks have many challenges, but its vast number of applications lures researchers to investigate more into it. A thorough investigation reveals that WSN is a multidisciplinary field. On one side it demands scalable architecture from the hardware engineers to ensure good Quality of service; on the other end, it demands

energy efficient algorithms and protocols from software engineers to make them practical and feasible. Energy saving is one of the main concern and various research issues ultimately boils down to minimize it by all means. Overall, a holistic approach and coordinated effort is desired from the research fraternity to make WSNs a reality. These efforts are worth as WSNs hold a vast potential for the overall benefit of mankind and to make pervasive computing a possibility in the coming times.

Conclusion

In this survey we have discussed the wireless technology starting from its evolution, history, underlying technology considerations, various issue and challenges. We have also described the comprehensive work done so far in the field of WSN. Wireless sensor network is a hot area for researchers but there are still some challenges which need to be addressed and resolved. For example: there is still no mechanism to provide the global identification to the sensor nodes. Extensive research has been done so far with the assumptions that nodes are homogeneous in terms of storage and communication capabilities. Further research may be done by deploying the heterogeneous nodes. Till now research has been carried out with single and stationary sink nodes In future we can evaluate the performance of the network having multiple and mobile sink nodes. Further research would be needed to address QoS of clustering routing, which mainly exists in real-time applications, such as battle-target tracking, emergent-event

monitoring, and etc. Recently there is very little research focuses on handling QoS requirements in the resource-constrained WSN environment. Finally, with the increase of the network scale in WSNs, more redundant information is created and a certain degree of redundancy may be desirable for increasing reliability of the network. Thus, a trade-off between redundancy reduction and redundancy utilization is still an open question. In the hole problem various research have been done in the areas of detection, prevention and avoidance of holes, but very less work has been done in the area of repairing the holes. Logical and Semantic holes have been studied very less. Further research is needed to be done in the area of incorporating the security requirements which may facilitate the information collection. Various studies are needed to address the energy efficient MAC protocols. In the future, work can be carried out to integrate the wireless sensor networks with the internet. Extensive research is needed for the coverage preservation and connectivity maintenance in the field of heterogeneous sensor networks.

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