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Chapter 1 : Web Exclusive: Industrial Wireless Sensor Networks - ISA

Industrial Wireless Sensor Networks: Applications, Protocols, and Standards is a valuable tool for students, practicing engineers, researchers, entrepreneurs, and scientists working in the areas of sensor networks and devices, industrial computer and sensor networks, instrumentation, and electrical and computer engineering.".

There are an increasing number of small companies producing WSN hardware and the commercial situation can be compared to home computing in the s. Many of the nodes are still in the research and development stage, particularly their software. Also inherent to sensor network adoption is the use of very low power methods for radio communication and data acquisition. The Gateway acts as a bridge between the WSN and the other network. This enables data to be stored and processed by devices with more resources, for example, in a remotely located server. Wireless[edit] There are several wireless standards and solutions for sensor node connectivity. Thread and ZigBee can connect sensors operating at 2. With the emergence of Internet of Things , many other proposals have been made to provide sensor connectivity. Wi-SUN [19] connects devices at home. WSNs may be deployed in large numbers in various environments, including remote and hostile regions, where ad hoc communications are a key component. For this reason, algorithms and protocols need to address the following issues: Increased lifespan Robustness and fault tolerance Self-configuration Lifetime maximization: To conserve power, wireless sensor nodes normally power off both the radio transmitter and the radio receiver when not in use. Recently, it has been observed that by periodically turning on and off the sensing and communication capabilities of sensor nodes, we can significantly reduce the active time and thus prolong network lifetime. However, this duty cycling may result in high network latency, routing overhead, and neighbor discovery delays due to asynchronous sleep and wake-up scheduling. These limitations call for a countermeasure for duty-cycled wireless sensor networks which should minimize routing information, routing traffic load, and energy consumption. Researchers from Sungkyunkwan University have proposed a lightweight non-increasing delivery-latency interval routing referred as LNDIR. This scheme can discover minimum latency routes at each non-increasing delivery-latency interval instead of each time slot. Simulation experiments demonstrated the validity of this novel approach in minimizing routing information stored at each sensor. Furthermore, this novel routing can also guarantee the minimum delivery latency from each source to the sink. Performance improvements of up to fold and fold are observed in terms of routing traffic load reduction and energy efficiency, respectively, as compared to existing schemes [22]. Operating systems[edit] Operating systems for wireless sensor network nodes are typically less complex than general-purpose operating systems. They more strongly resemble embedded systems , for two reasons. First, wireless sensor networks are typically deployed with a particular application in mind, rather than as a general platform. Second, a need for low costs and low power leads most wireless sensor nodes to have low-power microcontrollers ensuring that mechanisms such as virtual memory are either unnecessary or too expensive to implement. However, such operating systems are often designed with real-time properties. TinyOS is perhaps the first [23] operating system specifically designed for wireless sensor networks. TinyOS is based on an event-driven programming model instead of multithreading. TinyOS programs are composed of event handlers and tasks with run-to-completion semantics. When an external event occurs, such as an incoming data packet or a sensor reading, TinyOS signals the appropriate event handler to handle the event. Event handlers can post tasks that are scheduled by the TinyOS kernel some time later. Online collaborative sensor data management platforms[edit] Online collaborative sensor data management platforms are on-line database services that allow sensor owners to register and connect their devices to feed data into an online database for storage and also allow developers to connect to the database and build their own applications based on that data. Examples include Xively and the Wikisensing platform. Such platforms simplify online collaboration between users over diverse data sets ranging from energy and environment data to that collected from transport services. The architecture of the Wikisensing system [25] describes the key components of such systems to include APIs and interfaces for online collaborators, a middleware containing the business logic needed for the sensor data management and processing and a storage model suitable for the efficient storage and retrieval of large volumes of data. Simulation[edit] At present, agent-based modeling and simulation is the only paradigm which allows the simulation of complex behavior in the environments of wireless sensors such as flocking. Agent-based modelling was originally based on social simulation. Security[edit] Infrastructure-less architecture i. Therefore, security is a big concern when WSNs are deployed for special applications such as military and healthcare. Owing to their unique characteristics, traditional security methods of computer networks would be useless or less effective for WSNs. Hence, lack of security mechanisms would cause intrusions towards those networks. These intrusions need to be detected and mitigation methods should be applied. More interested readers would refer to Butun et al. Distributed sensor network[edit] If a centralized architecture is used in a sensor network and the central node fails, then the entire network will collapse, however the reliability of the sensor network can be increased by using a distributed control architecture. Distributed control is used in WSNs for the following reasons: Sensor nodes are prone to failure, For better collection of data, To provide nodes with backup in case of failure of the central node. There is also no centralised body to allocate the resources and they have to be self organized. Data integration and sensor web[edit] The data gathered from wireless sensor networks is usually saved in the form of numerical data in a central base station. Additionally, the Open Geospatial Consortium OGC is specifying standards for interoperability interfaces and metadata encodings that enable real time integration of heterogeneous sensor webs into the Internet, allowing any individual to monitor or control wireless sensor networks through a web browser. As nodes can inspect the data they forward, they can measure averages or directionality for example of readings from other nodes. For example, in sensing and monitoring applications, it is generally the case that neighboring sensor nodes monitoring an environmental feature typically register similar values. This kind of data redundancy due to the spatial correlation between sensor observations inspires techniques for in-network data aggregation and mining. Aggregation reduces the amount of network traffic which helps to reduce energy consumption on sensor nodes. Aggregation complicates the already existing security challenges for wireless sensor networks [30] and requires new security techniques tailored specifically for this scenario. Providing security to aggregate data in wireless sensor networks is known as secure data aggregation in WSN. Two main security challenges in secure data aggregation are confidentiality and integrity of data. While encryption is traditionally used to provide end to end confidentiality in wireless sensor network, the aggregators in a secure data aggregation scenario need to decrypt the encrypted data to perform aggregation. This exposes the plaintext at the aggregators, making the data vulnerable to attacks from an adversary. Similarly an aggregator can inject false data into the aggregate and make the base station accept false data. Thus, while data aggregation improves energy efficiency of a network, it complicates the existing security challenges.

Chapter 2 : World Industrial Wireless Sensor Networks Report 12 Market - KXXV Central Texas News Now

Industrial Wireless Sensor Networks: Applications, Protocols, and Standards examines the current state of the art in industrial wireless sensor networks and outlines future directions for research. What Are the Main Challenges in Developing IWSN Systems?

Chapter 3 : Industrial Wireless Sensor Networks: Applications, Protocols, and Standards - CRC Press Boo

Industrial Wireless Sensor Networks: Applications, Protocols, and Standards [Book News] Abstract: This book offers an in-depth state of the art in sensor network technologies for industry applications while also dealing with emerging and already deployed industrial WSN applications and technologies.

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Chapter 4 : IoT Standards & Protocols Guide | Comparisons on Network, Wireless Comms, Security, Indus

The collaborative nature of industrial wireless sensor networks (IWSNs) brings several advantages over traditional wired industrial monitoring and control systems, including self-organization, rapid deployment, flexibility, and inherent intelligent processing.

Chapter 5 : Wireless sensor network - Wikipedia

In this regard, IWSNs play a vital role in creating more reliable, efficient, and productive industrial systems, thus improving companies' competitiveness in the marketplace. Industrial Wireless Sensor Networks: Applications, Protocols, and Standards examines the current state of the art in industrial wireless sensor networks and outlines.

Chapter 6 : WirelessHART - Wikipedia

Industrial Wireless Sensor Networks: Monitoring, Control and Automation explores the explosive growth that has occurred in the use of wireless sensor networks in a variety of applications during the last few years.

Chapter 7 : Industrial Wireless Sensor Networks

ANT is a proprietary wireless sensor network technology featuring a wireless communications protocol stack that enables semiconductor radios operating in the GHz Industrial, Scientific and Medical allocation of the RF spectrum ("ISM band") to communicate by establishing standard rules for co-existence, data representation, signalling.