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SURVEY ON SECURITY ISSUES IN WIRELESS SENSOR NETWORK

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ABSTRACT- This survey paper described the concept of Wireless Sensor Networks that are viable by the conveyance of wireless communications and digital electronics section I explores the deployment of sensor nods and its uses. The various types of WSN are also discussed. Protocols proposed for WSN are explored in section II and importance of energy efficiency in section III. Security issues in sensor Networks are discussed in Section IV. Since sensor networks are in a threat of node facades and attacks. Finally the various applications of sensor networks like Green houses, Environment monitoring, Health, Underwater sensor networks and Wireless Body Area Networks are explored in details.

1. INTRODUCTION

Wireless Sensor Networks have recently st and up as a leading research topic. They have great long-standing economic future, ability to transmute our lives, and pose many new system-building tasks. With the improvement of energy gathering techniques that can crease useful energy from vibrations, blasts of radio energy and the like, self powered circuitry is a very real opportunity, with networks support of millions of odes, locatedthroughinjections, paintbrushes, and aircraft. Also, another type of sensor nodes authorizing the network to self-organize and "study", by embedding smart and adaptive algorithms. On the other hand, The use of adaptive power control in IP networks that uses sleep-mode operation, reactive routing protocols and more powerful mobile agents, QoS (Quality of Service) to security mechanisms, guarantee delivery, fault-tolerance and robustness .Wireless sensors have great tool for military applications involving intrusion detection, perimeter monitoring, information gathering and smart logistics support in an unknown organized area. Some other applications: sensor-based personal health monitor, location detection with sensor networks and movement detection, Green house Monitoring, Monitoring and control of industrial equipment, Environmental Monitoring.

And Fig 1 describes the Wireless Sensor Network System Architecture.

Types of Wireless Sensor Network

Wireless Sensor Network has many types of sensor depending on the situation such as Terrestrial WSN, Underwater WSN, Underground WSN, Mobile WSN, and Multimedia WSN. Figure 2 represents the classification of WSN.

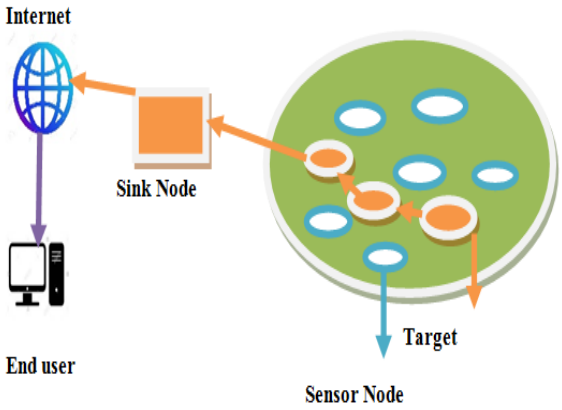

Figure. 1 : WSN System Architecture

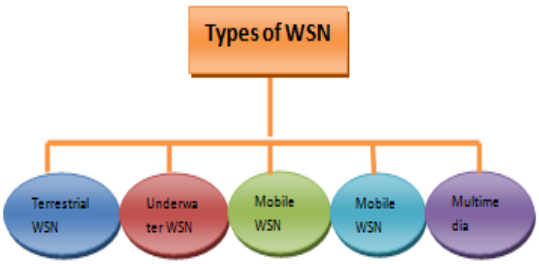

Figure 2.Classification of WSN

2. PROTOCOLS

There are several protocols proposed for WSNs (Wireless Sensor Network).

Communication, which is the most energy-costly aspect of the network, can be organized in three fundamentally different ways: Node-centric communication is the most popular and well understood paradigm, being currently used in the Internet. The other two, data-centric and position-centric, are more scalable, better adaptable to applications, and conceptually more appropriate in many cases, and therefore may effectively encounter the node-centric way of looking at the sensor networks.

From [1,] the MAC (Medium Access Control) layer reacts to this probabilistic reception information by adjusting. The number of acknowledgements and/or retransmissions.

Sensor Networks have different design and engineering challenges. One of the main characteristics of sensor networks is that the explanations tend to be very application specific. For this reason, a layered view like the one used in OSI executes a large drawback, and implementations more geared on the way to the particular are needed.

An exciting open problem for future research is to deliberate physical-layer-based routing and broadcasting. Wherever nodes may adjust their transmission radii. Predictable power consumption may then be measured a primary optimality measure.

Data –centric approaches, on the other, tend to provide a top-to-bottom explanation, as is the case with directed diffusion. Infact, directed diffusion solves only one problem, but solves it right. A new IEEE standard, 802.15.4, is meant at low-power low-distance communication devices that may allow years of battery lifetime. The standard allows for both hierarchical and flat peer-to-peer topologies, and provisions for one hop reliability and real-time guarantees.

Constrained anisotropic diffusion routing (CADR) [2] is a protocol, with strives to be a general form of Directed Diffusion. Two methods namely information-driven sensor querying (IDSQ) and constrained anisotropic diffusion routing are projected. The idea is to query sensors and route data in a network in order to exploit the information gain, while minimalizing the dormancy and bandwidth.

3. ENERGY

Wireless sensor must minimize overall power consumption in order to maximize operational lifetime. The primary focus is on networks that use a mixture of higher-powered IP-speaking nodes. Graphs-theoretic techniques are used to investigate heuristics for guaranteeing full network connectivity in network consisting of sensors with differing transmission ranges.

The hybrid energy efficient distributed clustering approach for ad-hoc sensor network was presented. Cluster heads are randomly selected based on their residual energy, and nodes join clusters such that communication cost t is minimized [3].

Simulation results were provided for the use of adaptive power control in IP networks that utilize reactive routing protocols and sleep-mode operation. First, clustering is useful in "hand-emplaced" networks, but may be less soin"random lay-downs" that contain both high-powered and low-power radios. Second, reactive routing-protocols with topology-based Adaptive Power Control improve energy usage in sensor networks. Third, reactive routing was compatible with sleep-mode operation and Adaptive Power Control (APC).

If we referred to a large scale low power sensor network to as sensor networks with mobile agents (SNMA), SENMA exploits node redundancies by introducing mobile agents that communicate opportunistically with a large field of sensors. The addition of mobile agents shifts computationally intensive tasks away from primitive sensors to more powerful mobile agents, which enables energy efficient operations under severely limited power constraints.

A micro sensor network that can gather and transmit data for year's demands nodes that operate at energy efficiencies unheard of in today's wireless systems. Sensor nodes must take advantage of operational diversity, such as the long periods of idle time between interesting events, by gracefully scaling back energy consumption. The user must precisely define the network's performance requirements using metrics ranging from latency to accuracy to reliability so that the network performs just enough computation to meet the user's specific demands.

4. SECURITY

From [5][6], sensor networks square measure expected to play associate essential role within the coming age of pervasive computing. Due to their constraints in computation, memory, and power resources, their susceptibleness to physical capture, and use of wireless communications, security could be a challenge in these networks. The size of deployments of wireless sensing element networks need careful decisions and trade-offs among varied security measures Depending on the appliance, a sensing element network shouldsupport sure QoS (Guaranteed delivery [7]) aspects such as time period constraints (e.g., a physical event should be reportable at intervals a definite amount of time), robustness (i.e., the network ought to stay operational even though sure well outlined failures occur), tamper-resistance (i.e., the network ought to stay operational even once subject to deliberate attacks), eavesdropping resistance (i.e., external Entities cannot snoop on information traffic), and unobtrusiveness or stealing (i.e., the presence of the network should be laborious to detect). These needs might impact alternative dimensions of the planning house like and resources From [8], current security mechanisms in ad-hoc sensor networks don't guarantee reliable and sturdy network practicality. Even with these mechanisms, the sensor nodes can be created non-operational by malicious attackers or physical break-down of the infrastructure .Measurement of the network characteristics in a very 'threat' of network failure is important to know the behavior of these networks Two main objective of this research work are the analysis of performance variation and measuring the effects of the threats to a sensor network i.e. threat of node failures, attack on nodes etc. Two metrics: connectivity cost and disconnectivity coefficient; the former studies the performance variation is when a network topology is subject to handle different threats, during the latter measures the impact of the threat(s) on the sensor network.

5. APPLICATIONS

WSN is ubiquitously used everywhere in modern society. It has been successfully implemented in diverse fields such as military, health, business and industry application. Some of application explained below.

Area	Applications
Military	Military situation awareness Sensing intruders on bases, detection of enemy units movements on land/sea,chemical/biological threats and offering logistics in urban warfare Battlefield surveillance Command, control, communications, computing, intelligence, surveillance, reconnaissance, and targeting systems
Public safety	It's using for disaster sitesin Sensing and location determination
Agriculture	Sensing of soil moisture, pesticide, herbicide, pH levels
Medical /Health	Monitoring people's locations and health conditions Sensors for: blood flow, respiratory rate, ECG (Electrocardiogram), pulse oxymeter, blood pressure,and oxygen measurement Monitor patients and assist disabled patients
Emergency situations	Hazardous chemical levels and fires (petroleumsector). Fire/water detectors Monitoring disaster areas
Industrial	Monitoring and control of industrial equipment .Factory process control and industrial automation

TABLE1: Some Wireless Sensor Network for Different areas

GREEN HOUSES

The main objective was smoothly measuring the temperature with the high resolution horizontal data to save the heat energy in greenhouses, as well as for achieving appropriate and valid results with the help of previously mentioned modules that were employed in collaboration with an agriculture chamber by using a vertical data. [9] In 2013 employed a system for greenhouse climate control in Punjab, India. They developed a system for the development of plants which monitoring and analyzing the ambient atmospheric parameters. For the improvisation and enhancement of the techniques, they incorporated and integrated system which automaticallymonitorsanalysesand issues pertaining to their problem.

ENVIRONMENT MONITERING

In WSN there are various requirements of environmental monitoring .Its used to measuring the parameters of wind speed and direction .Many of them are slow in changing behavior which allows one to sample them effectively from one to five minutes as they react.

Forest fire detection was strategically, randomly, and densely deployed in a forest, sensor nodes can relay the exact origin of the fire to end users before the fire spread uncontrollable.

Flood detection is the application is the ALTERT system are rainfall, water level and weather sensors. These sensors supply information to the centralized database system in a predefined way [9].

Precision Agriculture Monitoring was some of the benefits are the ability to monitor the pesticides level in the drinking water.

WSN AND HEALTH

In health application, WSN uses an advanced medical sensor to improve health applications. WSN used to monitor diseases like Alzheimer's and Heart Attacks [9].

Telemonitoring of Human Physiological data is to collect the phycological data by the sensor networks can be stored for a long period of Time [9].To monitor and detect the people's behavior using the installed sensor network.

Drug administration is minimized the chance of getting and prescribing the wrong medications to patients .As well as to identify the allergies and required medications of patients.

Another medical application refers to human vision restoration by retina prosthesis. Sensors are implanted to human organs to support a function and they require the capabilities to

communicate wirelessly with an external computer system, which carries out the advanced processing.

UNDERWATER SENSOR NETWORK

In underwater environment research is facing many challenges such as localization, node mobility, end to end delay, dynamictopology, energy consumption, and effective communication. WSN are an emerging technology today, and are made up of a large number of separated tiny embedded sensor nodes that are used in monitoring and sending data from their surroundings. The UWSN (Underwater Wireless Sensor Network) consist of four different numbers of sensor nodes, Nodes that are anchored to the sea bottom have randomly floated with the water current.

UWSN is also widely used in underwater oil and gas-pipeline corrosion detection and military security application. It is also used to design an efficient UWSN routing protocol.

WIRELES BODY AREA NETWORK

The usage of wireless devices has been increasing constantly; several fashionable technologieshave been designed that are using wireless networks, manufacturing good results and creating severalchallenging and strict technologies accessible and straightforward to use.Special Wireless Devices for Healthcare Systems are called Wireless Body Area Networks (WBANs). [9] WBANs introduced a dynamic arena of development and analysis into today's life. WBANs contributed their application ubiquitously. The literature suggests that WBANs can broaden their horizon in terms of a person's being's activity. Pertaining to human health, WBAN systems provide associate insight into the physiological conditions of a human being.

Generally, WBANs monitor the real time condition of health and send feedback to the end user or physicians via the property. Mostly, they're accustomed monitor physiological parameters such as the heartbeat, temperature, stress level, and O level. In spite of those physiological parameters, they conjointly monitor and analyze the routine of exercise and also the demand of the human body.

CONCLUSION

In this research work, a survey on Wireless Sensor Networks (WSN) and their technologies, Protocols, WSN Energy and applications was carried out. Wireless sensor networks consist of small nodes with sensing, computation, and wireless communications capabilities. Many routing, power management, and data dissemination protocols have been specifically designed for WSNs where energy awareness is an essential design issue. Routing protocols in WSNs might differ depending on the application

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.

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