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A REVIEW ON EVOLUTION OF WIRELESS SENSOR NETWORK

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Abstract: Wireless Sensor Network is that network in which many applications are developed for remote environment monitoring and target tracking. This network is enabled by availability in recent years due to some features that is a smaller cheaper intelligent. These senses are with wireless platforms with which they can communicate with each other to make a network its design depend on the application and must take factors such as the environment the applications design aims, price, hardware, and system restrictions. The main aim of the survey is to present in the review of the recent literature in WSN. This paper reviews the major development & challenges in this area.

Keywords: wireless sensor network, cooperative network, active sensor, Architecture of WSN

I. INTRODUCTION

A Wireless Sensor Network (WSN) is a wireless network containing of special distributed autonomous devices using sensors to monitor physical or environmental [1]. There are three research areas on sensor networks – sensing, communication, and calculating. E.g. is sensor networks contain the radar networks used in air traffic control and the national power grid which can be viewed as one larger sensor network [1], [2]. There are many protocols and algorithms which have been proposed for WSN in recent years [1]. In WSN we used TDMA MAC protocol which assumed that sensor and a node both are of same type and does not reflect the real WSN [3].The routing problem which is found out between sensor and actor network [4]. Militant surrounding where human environment may to be harmful sensor network provides error free service. A wireless sensor network includes a large no. of small, low-energy sensor nodes, and a node has sensing, data processing, and wireless technology components. Wireless Sensor nodes have attracted much attention due to their large range of apps, such as military, surrounding monitoring, and health care industry etc. Unlike wired, mobile ad-hoc network, wireless ad-hoc network, and wireless sensor network are without infrastructure. It can work in any surrounding as compared to the traditional network. A key management is implemented in order to provide security for sensor network. Traditional protocols and algorithms are not well suited for the unique features and application requirements of wireless sensor network. As compared to wired network, wireless sensor network has limited power, are real time, utilize sensors and actuators as interfaces. This type of network is applied to many apps, such as smart living, surrounding monitoring, automatic evaluation, healthcare, and traffic monitoring etc. [5].

II. WIRELESS SENSOR NETWORK

In this network, it is a significant work to gather the data period wise from different sensor nodes for monitoring, and storing the physical situations of the environment. The sensed data must be sent and received through the nodes in the network. This type of network is a broadcast network; which includes a no. of sensors that are effective for collecting data in a variety of environments. Because sensors work on battery power, it is most challenging objective to design the energy efficient routing protocols [6].

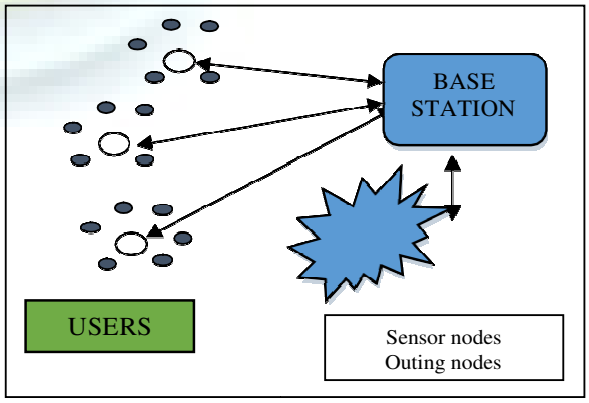

Fig. 1. Cooperative Network

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This network is a combination of nodes which organized into a cooperate network. In this network, each node includes processing capabilities, types of memories, RF transceiver, a power source, and accommodates different sensors, and actuators.

In Wireless Sensor Network, wireless means without wires, sensors are used to monitoring the environment, used to collecting, storing, and sharing the data and network is a set of devices connected by communication link [5]. Sensor nodes are divided into three types:-

- Active, passive, and Omni directional sensors
- Passive narrow-beam sensors
- Active sensors

A. Active passive and Omni directional sensors

In this case, the energy is required only to amplify their analog signal.

B. Passive narrow-beam sensors

These sensors are passive because they are related to direction when sensing the environment.

C. Active Sensor

These actively probe the environment.

To make the wireless sensor network sight a reality, architecture must be developed that combined the visualized apps.

III. ARCHITECTURE OF WIRELESS NETWORK

The most regular WSN architecture follows the OSI architecture Model. The architecture of the WSN includes five layers and three cross layers [7]. Usually in sensor network we need five layers: - application, transport, network layer, data link & physical layer. The three cross planes are power management, mobility management, and task management. These layers of the WSN are used to achieve the network and make the sensors work collectively in order to raise the complete efficiency of the network.

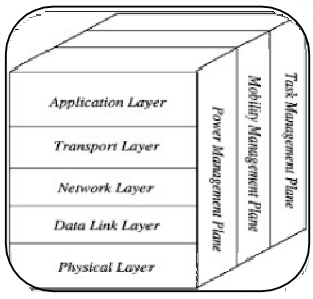

Fig. 2. Architecture of WSN

A. Application Layer

The application layer is liable for traffic management and offers software for many applications that change the data in a clear form to find positive information. Sensor networks organized in many applications like agricultural, military, environment, medical etc. [7].

B. Transport Layer

The purpose of the transport layer is to provide congestion avoidance and reliability where a lot of protocols calculated to offer this purpose are either practical on the above. These protocols use heterogeneous mechanisms for loss identification and loss recovery. The transport layer is exactly needed when a node is planned to contact other networks [7].

Providing a reliable loss recovery is more energy efficient and that is one of the main causes why TCP is not fit for WSN. In common, Transport layers can be differentiated into Packet driven, Event driven. There are many popular protocols in the transport layer like Sensor Transmission Control Protocol, Price-Oriented Reliable Transport Protocol, and pump slow fetch quick [8].

C. Network Layer

The main purpose of the network layer is routing, it has a lot of tasks based on the application, but actually, the main tasks are in the power maintaining, partial memory, buffers, and sensor don't have a universal ID and have to be self-organized [9].

The simple idea of the routing protocol is to describe a reliable path and duplicate path, according to a persuade scale called metric, which changes from protocol to protocol. There are a lot of presenting protocols for this network layer, they can be differentiated into; flat routing and hierarchal routing or can be differentiated into time driven, query-driven & event driven.

D. Data link Layer

The data link layer is liable for multiplexing data frame detection, data streams, MAC, & error control, verify the reliability of point–point (or) point– multipoint [8].

E. Physical Layer

The physical layer provides a order for transferring a stream of bits above physical channel. This layer is responsible for the selection of frequency, generation of a carrier frequency, signal detection, Modulation & data encryption. IEEE 802.15.4 is advised as complex for low rate special areas & wireless sensor network with low cost, power consumption, density, the range of communication to improve the battery life. CSMA/CA is used to support star & peer to peer topology. There are many versions of IEEE 802.15.4.V [10].

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IV. APPLICATIONS OF WIRELESS NETWORKS

The development of WSN was developed by many applications like Area Monitoring, Health Care Monitoring, Air Pollution Monitoring, Forest Fire Detection, Water Quality Monitoring, Data Center Monitoring etc. [11].

V. CONCLUSION

In this review paper, I reviewed the introduction, Wireless Sensor Network, Architecture of Wireless Sensor network, Applications, and Conclusion and Future Scope. This paper also concludes that most of the attacks against security in wireless sensor Networks are caused by the insertion of false information by the compromised nodes within the network. In future, sensor network will be everywhere in order to make future infrastructure as smart as possible, and it includes Healthcare, Smart homes thorough sensors Environment monitoring, security, IoT, etc.

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