Journal of The Gujarat Research Society
ISSN: 0374-8588
Volume 21 Issue 13, December 2019

A Comprehensive Review onWireless Sensor Networks for Fire Detection

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ABSTRACT:The manufacturing of the small and low-cost sensors has become technically and economically feasible as a result of current technological advances. There has been developed various types of sensor across the globe in order to determine the conditions of the environment across the globe. The wireless sensor networks play a crucial role in order to detect the fire conditions worldwide. Wireless Sensor Network (WSN) consists of spatially distributed autonomous sensors to cooperatively monitor physical or environment conditions, such as temperature, sound, Vibration, pressure, motion or pollutants.The development of wireless sensor networks was inspired byMilitary technologies such as battlefield surveillance are also used in many areas of industrial and civil applications, monitoring and regulation of industrial processes, environmental monitoring of machine health, ecosystem monitoring, healthcare applications, home automation and traffic control.

KEYWORDS: Fire Detection, Fire,Forest, Environment Condition, Wireless Sensor Network.

INTRODUCTION

In this paper, authors proposed a wireless sensor network paradigm to detect the real-time forest fire monitoring. The wireless sensor network could determine and forecast forest fire more promptly than the traditional satellite-based detection methods. This paper primarilydefines the data collecting and processing in wireless sensor networks for real-time forest fire detection. A neural network method is applied to in-network data processing. We evaluate the performance of our approach by simulations[1].In Mediterranean countries, forest and rural fires are one of the major causes of environmental degradation. Current systems for the detection of fire only concentrate on detection, but not on fire verification. Almost all of them, though, are only simulations, and there are very few implementations to be found. In addition, the structures in the literature lack scalability[2].

The fires in the forests are one of the primary causes of environmental degradation in the modern world. The present surveillance systems for forest fires lack in supporting real-time monitoring of every point of a region at all times and early detection of fire threats. Solutions using wireless sensor networks, on the other hand, can gather sensory data values, such as temperature and humidity, from all points of a field continuously, day and night, and, provide fresh and accurate data to the fire-fighting center quickly. However, sensor networks face serious obstacles like limited energy resources and high vulnerability to harsh environmental

conditions that have to be considered carefully. In this paper, we propose a comprehensive framework for the use of wireless sensor networks for forest fire detection and monitoring[3].

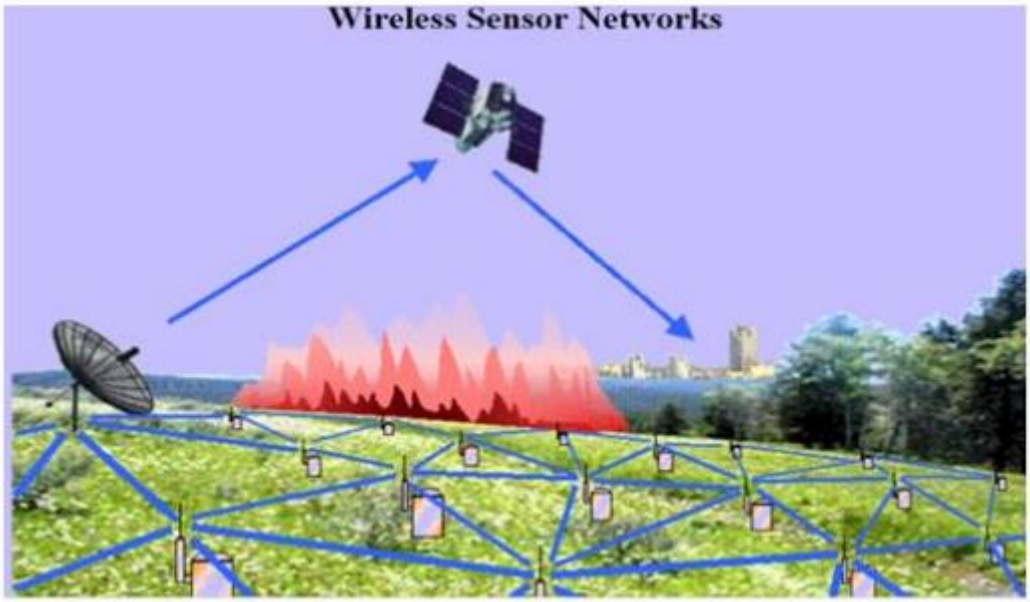

Figure 1: Illustrates the connectivity through the wireless sensor networks

Wireless network technologies have become the cornerstone of modern precision agriculture monitoring, helping to collect distributed data, monitor in harsh conditions, accurately irrigate and supply fertilizers to generate profuse crop production while lowering costs and helping farmers collect data in real time. A mass of interconnected micro sensor nodes were deployed in the monitoring area inside the wireless sensor network, and all of them were deployed in the monitoring area. Types of data on the targeted area were collected by the cooperative nodes that were carried out by embedded systems, which were then passed to the user [5]. Figure 1 illustrates the connectivity through the wireless sensor networks. Table 1 shows the wireless sensor network and its application.

Table 1: Wireless Sensor Network and Its Application.

Installation	Difficult to moderate	Easy installation
Time to install	More	Less
Mobility	Limited	Outstanding

User connectivity	Connectivity is possible only to or from those physical locations	Connectivity is possible beyond the bounds of physical network

LITERATURE REVIEW

Another paper on wireless multimedia sensor networks was carried out by Akyildiz et al. In recent years, the increasing interest in the wireless sensor network (WSN) has resulted in thousands of peer-reviewed publications. Most of this research is based on scalar sensor networks that quantify physical phenomena that can be transmitted via low bandwidth and delay-tolerant data streams, such as temperature, pressure, humidity or object location. The focus has recently shifted to studies to revisit the sensor network paradigm to allow multimedia content, such as audio and video streams and still images, as well as scalar data [6].

Another survey on the routing strategies in wireless sensor networks was performed by Al-Karaki et al. Small nodes with sensing, computing and wireless networking capabilities consist of wireless sensor networks. Many routing, power management, and data dissemination protocols have been specifically developed for WSNs, where energy awareness is an important design challenge. Routing protocols in WSNs could differ based on the application and network architecture. Furthermore, these protocols can be categorized into multipath-based, query-based, negotiation-based, QoS-based, and coherent-based, depending on the protocol operation[7].

DISCUSSION AND CONCLUSION

In this paper, the authors presented forest fire detection in Zigbee projects that use wireless sensor networks to measure and transmit useful data in their architectures. A sensor node's function is to sense the environment, to transmit and to share sensory data with other nodes in the field. In digital transmission, the industrial application of wireless sensor networks to track temperature and humidity in the forest in a more timely and accurate way, we have highlighted unique advantages of data transmission security, network building versatility and low cost and energy requirements for a forest fire monitoring system.

The wireless sensor network technology has a greater benefit compared to the conventional method of fire prevention, and there are wide prospects for use in forest fire monitoring. Research on the use of wireless sensor networks in the detection of forest fires abroad is still in the laboratory stage, and China's research in this field is even less limited to preliminary exploration of the layout of wireless sensor network nodes, topology, aspects of network security, and radio wave transmission characteristics in forest research. The propagation of electromagnetic waves is severely compromised by ground plants, trees in complex forest site environments.

ISSN: 0374-8588
Volume 21 Issue 13, December 2019

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