

Study of ZIGBEE Technology and its Application in Wireless Automation System

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ABSTRACT

Wireless Automation System has drawn acceptable attentions of researchers or people using it for more than a decade. These systems can be implemented by using technologies as mentioned: Z-Wave, Insteon, Bluetooth, WiFi, Wireless and ZigBee. In the above mentioned technologies ZigBee based systems users have increased gradually in different applications scenarios due to its low cost and low power consumption. ZigBee is formulated by IEEE 802.15.4 radio standards and it is one of the mostly used transceiver standard that is used as a communication technology to connect local networks. In this paper detailed study of ZigBee has been interpreted and its application in automation system has also been discussed.

KEYWORDS: Insteon, Sensors, ZigBee, Intelligent Surveillance, Topologies

1. INTRODUCTION

The process of operating or controlling different equipments, machinery, industrial processes and applications with the use of various control systems with less or no human interaction is termed as Automation Systems. These Automation Systems based on applications can be categorized in home automation, industrial automation, autonomous automation, building automation etc. So, in this research paper Home Automation Systems has been explained in detail. Home Automation is the process of controlling home appliances automatically with the help of various control system techniques. The appliances such as fan, lights, outdoor lights, fire alarm, etc., can be controlled using different techniques. The WHAS (Wireless Home Automation Systems) has reduced the cost of operation and maintenance and additionally, it has provided security, safety and remote monitoring capabilities. Normally Wireless Home Automation System consists of low power wireless sensors operated by battery and actuators attached with the home appliances. These sensors and actuators are connected to the backbone wireless network. Wireless Home Automation System has become popular and widely affordable due to cheap sensors, actuators and wireless modules. However nowadays, Wireless Home Automation Systems can be controlled and monitored from remote location at any time and from anywhere. In past few years many solutions have been proposed for Wireless Home Automation Systems such as Z-wave, Insteon, Wireless, Bluetooth, WiFi and ZigBee. In

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this paper we have discussed about ZigBee based Wireless Home Automation Systems.

ZigBee Technology:

The ZigBee technology was introduced by ZigBee Alliance and it has been evolved based on standardized set of solutions called 'layers'. These layers have provided distinctive features which includes low cost, easy implementation, reliability, low power and high security to ZigBee. As ZigBee was built on the top of IEEE 802.15.4 standard, the IEEE 802.15.4 standard defines the characteristics of physical layer and Medium Access Control layer (MAC) for Wireless Personal Area Network (WPAN). Devices are the main components of WPAN which are actually defined as physical type and logical type. The physical type-device has been further divided into two-types such as Full Functional Device (FFD) and Reduced Functional Device (RFD). Any device can act as sensor node, control node, and composite node depending on its type. Only routing function of network is performed by FFD.

Logical type devices have been further divided into three types such as coordinator, router and end-device. Among these devices Coordinator device is the most capable device, which forms the root of network. There must be exactly one coordinator to initiate the formation of a network and it also acts as a bridge to other networks.

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Signal Interference in WiFi and ZigBee Networks Gaotao Shi, Keqiu Li, 2016-10-24 This book systematically summarizes the fundamentals of WiFi and ZigBee from different levels and provides the detailed theoretical and experimental results for signal interference between these two wireless data transmission technologies The existing mechanisms and methods of interference mitigation avoidance and co existence are carefully explored Both collaboration and cross technology communication between WiFi and ZigBee are also introduced as key research trends Due to the popularity of WiFi and ZigBee which share the same ISM frequency band interference is a common problem and addressed in a wide range of literature This book condenses the newest research results into an approachable format This is an essential resource for professionals and students in wireless networks as well as network engineers designers or planners seeking a backbone of knowledge in WiFi and ZigBee networks

ZigBee Wireless Networks and Transceivers Shahin Farahani, 2011-04-08 ZigBee is a short range wireless networking standard backed by such industry leaders as Motorola Texas Instruments Philips Samsung Siemens Freescale etc It supports mesh networking each node can transmit and receive data offers high security and robustness and is being rapidly adopted in industrial control monitoring and medical applications This book will explain the ZigBee protocol discuss the design of ZigBee hardware and describe how to design and implement ZigBee networks The book has a dedicated website for the latest technical updates ZigBee networking calculators and additional materials Dr Farahani is a ZigBee system engineer for Freescale semiconductors Inc The book comes with a dedicated website that contains additional resources and calculators <http://www.learnZigBee.com> Provides a comprehensive overview of ZigBee technology and networking from RF physical layer considerations to application layer development Discusses ZigBee security features such as encryption Describes how ZigBee can be used in location detection applications Explores techniques for ZigBee co existence with other wireless technologies such as 802.11 and Bluetooth The book comes with a dedicated website that contains additional resources and calculators <http://www.learnZigBee.com>

Time Synchronization for ZigBee-Based Wireless Sensor Networks [1], 2005

Wireless Technology (ZigBee) for Communication in Substation Amit Reddy Kandela, 2012 Automation plays an important role in the electric substation A lack of controlling and monitoring of the devices may result in accidents therefore automation of devices is very important The IEC 61850 communication protocol is designed to maintain common standards in all substations This paper discusses the concept of a wireless sensor network for automation The wireless sensor network uses ZigBee technology ZigBee is a low cost and low power Wireless mesh networking standard ZigBee Network is based on IEEE 802.15.4 standard ZigBee is used in many applications such as substation automation house security industrial security etc

ZigBee Complete Self-Assessment Guide Gerardus Blokdyk, 2018 ZigBee Complete Self Assessment Guide

Mobility and Relative Location in a Zigbee Home Network Crystal Bateman, 2008

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