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A Review on WSN in IOT Environment with Smart Sensor Inter face

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Abstract

The Internet of Things (IoT) is the network of physical objects or 'things' embedded with sensors, electronics, software, and network connection capabilities. This enables these objects to collect and exchange the data. IoT allows these objects to be sensed and controlled remotely across network infrastructure, thus creating opportunities for more direct incorporation between the physical world and computer-based systems. This results in improved efficiency, accuracy and economical benefits. 'Things' in the IoT can refer to a wide range of devices such as heart monitoring system, biochip transponders on farm animals, automobiles with inbuilt sensors, or field operation devices. To develop these systems, smart technologies like Zig-Bee, Radio Frequency, Wireless Sensors Networks, and Actuators etc., are used.

Keywords: Wireless Sensor Network; IoT; Sensor Interface.

1. Introduction

A sensor is a device that detects events, quantity or changes in quantities and provides corresponding output, generally, in the electrical signal. Wireless sensor network (WSN) is spatially distributed autonomous sensors to monitor physical or environmental conditions such as temperature, force, humidity, pressure etc, and to cooperatively pass their data through the network to a main central location. The network can be unidirectional or bidirectional. Today such networks are used in many consumer and industrial and security application areas e.g. industrial process monitoring and control, machine health monitoring, battlefield surveillance etc. WSN implemented to reduce network overhead and to improve scalability. Internet of Things (IoT) is the interconnection of embedded computing devices with unique identification within the existing Internet network. IoT is the network of physical objects with sensors, electronics, software, and network connectivity to enable objects to exchange data with the operator and/or other connected devices [10]. IoT offers advanced connectivity of devices and systems that goes beyond machine to machine communications and covers a variety of protocol and applications. IoT brings benefits to many application areas such as industrial WSN, healthcare, manufacturing, and security systems. WSN sensor interface device is essential for detecting various kinds of sensor data connected to it. It enables us to gather sensor data, thus we can understand the environment information outside the node. In order to meet the requirements of environmental data acquisition in the IoT, the data acquisition interface device, e.g. FPGA, can collect multiple sensor data at the same time, more accurate and diverse data information can be collected from industrial WSN. Sensor interface device can be a Microcontroller based, ARM based or CPLD/FPGA based system which interconnects the various sensors and/or actuators, provides communication within them, and communication to the external system like computer or server through wired or wireless interface.

2. Literature Survey

Qingping Chi et al. [1], proposed a new method to design a reconfigurable smart sensor interface for industrial WSN in IoT environment. In this method complex programmable logic (CPLD) device is adopted as the main controller. CPLD provides the reading of sensor data in parallel and in real time with high speed on multiple different sensor data. CPLD also solves all previous problems like interrupt handling, current connect number, sampling rate etc. In traditional microcontroller based system, signal types of sensors are generally restricted by the device; this means each sensor connected to the device is required to write complicated and inconvenient data collection program code. In this new system IEEE1451.2 standard intelligent sensor interface specifications are used so that system can collect sensor data intelligently. Fig.1 shows the Systems functional block design.

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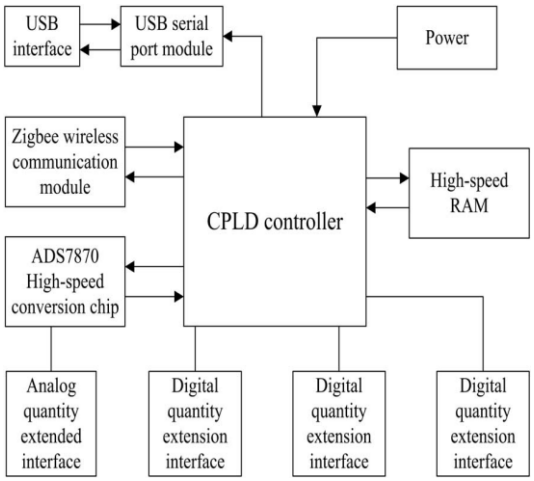

Fig.1: Systems functional block design.

This system is based on IEEE1451 protocol and combining with CPLD and the application of wireless communication; it is very suitable for the real time and high speed data acquisition system in IoT environment. The system achieved good results in practical application in taking real time monitoring of water environment in IoT environment.

Shifeng Fang et al. [2], presents water resource management based on geo-informatics including multiple technologies such as cloud services, Enterprise Information Systems (EIS), Geographical Information Systems (GIS), Global Positioning Systems (GPS), and Remote Sensing (RS). This paper also introduces a prototype IIS called Water Resource Management Enterprise Information System (WRMEIS) that combines data acquisition, data management and sharing, modelling, and knowledge management. The system provides best results for water and flood security. The system combines Snowmelt Flood Forecasting Enterprise Information System i.e. SFFEIS, based on the Water Resource Management Enterprise Information System. The system contains operational database, Extraction Transformation Loading (ETL), information warehouse. In which it contains management of information which allows participant to play the role as sensor and a contributor, to the information warehouse, temporal and distributed analysis, prediction models to predict the atmospheric condition, knowledge management is useful for the decision taking; which is provided by both users and public play the role of providing knowledge and data, and other several functions. This system is a prototype water resource management IIS which integrates geo-informatics, EIS, and cloud service. This system provides the crucial importance of a systematic approach toward IISs for efficient resource and environment management.

R. Karpaga Priya, T. Karpoora Eswari, and K. Akila kumari [4] presented an Industrial WSN in IOT Environment Interface with Smart Sensor Using ARM. This system is about developing an essential sensor interface device for sensor data collection in industrial Wireless Sensor Networks i.e. in Internet of Things (IoT) environment. In this system, ARM is developed as a core controller for interfacing industrial WSN in IoT atmosphere thus it can scan information in parallel, in real time and with high speed on multiple different devices, and for this intelligent device interface specification is adopted. Different sensors are interfaced with ARM to provide the values of physical parameters in industrial application like temperature, vibration, gas present in the industrial environment, thus the critical situation be avoided and preventives can be implemented. Result of the system gives value of Temperature is 67.4 ºC. Vibration and Gas sensor provides in terms of low, medium, or high value. High value indicated means that there is large gas and vibrations present.

Bharani M., Elango S., Ramesh S.M., and Preetilatha R. [5], presented a monitoring system for industries based on embedded system by interfacing different sensors with ATmega microcontroller. In this system various sensors are used for measurement of physical parameters like temperature, pressure, gas etc. In this system, sensors are interfaced with ATmega328p microcontroller which provides high performance. RISC-based Atmel 8 bit AVR microcontroller combines 32KB flash memory with simultaneous read-write capability, 1024B EEPROM memory, 23 general purpose I/O lines, 32 general purpose registers, three flexible timer/counters, internal and external interrupts, serial programmable, 6 channel 10 bit ADC, watchdog timer with internal oscillator, and five software selectable power saving modes. Zig-Bee module used to send the measured values from monitoring station to the controlling station, the data is sent over the Internet, if needed, via WAN. Received values are compared with the defined threshold values, the corresponding actions are taken if the measured values are out of the predefined range.

Gaurav Tiwari and Riyaz Kazi [6] presented Autonomic Smart Sensor Interface for Industrial in IOT Environment. Sensor operations are generally limited by the device because of the sampling rate, signal types and connect devices required to write complicated and complicated data collection programming code. To solve these problems, the paper provides the new method i.e. design a smart sensor interface for industrial WSN in IoT environment. In this method field programmable gate array device (FPGA) is used as a sensor interface device. Fig. shows the block diagram of proposed system i.e. Autonomic Smart Sensor Interface for Industrial in IOT Environment, Field programmable gate array device read sensor data in parallel, in real time with high speed on multiple different sensor data and the standard of IEEE1451.4 smart sensor interface specification is adopted for this design.

S.Pandikumar and R.S. Vetrivel [7] presents a GSM based design of smart home controlling system using IoT. The paper presents a method in which it enables the consumer to monitor and control the smart devices in home through the Internet, also the GSM based graphical interface between users and smart home using internet technologies i.e. it creates GSM based communication from the web server to the smart home devices. Users provides commands in user interface, the users commands are converted into GSM SMS based commands, these commands are sent to embedded system modules. The embedded system is directly connected to the devices via GSM network. The user commands are analysed and executed by microcontroller to control any electronic appliances like electric bulb, air conditioner etc, and the acknowledgement is sent back.

3. Conclusions

With the Wireless Sensor network and Internet of Things, data acquisition, processing and transmission are effectively achieved in real time and with the high speed, in different applications like Industry, security, smart home etc. Nowadays usage of Internet and Internet application are increasing. IoT is the new era of the Internet where physical things are connected to the Internet and can be monitored & operated remotely from any location. This paper provides objectives of IoT, most of the application areas where WSN and IoT are useful. Literature Survey provides various IoT based existing system and gives details about the systems.

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