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A Review on Smart Sensor Interface for Industrial WSN in IoT Environment

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Abstract

IoT is nothing but the Internet-of-Things in which where daily life all things connected to internet and can be monitor & can be operate remotely from anywhere. Daily life things like urban management, Green agriculture, industrial wireless sensor network or Industrial management, Environmental monitoring, Tele-medicine, intelligent transportation and smart homes etc. To develop such systems smart or standard technologies are used like Zigbee, Radio Frequency Identification, WSN (Wireless Sensors Network), and Actuators etc. This paper provides an overview on IoT and technologies used in IoT.

Keywords: *IoT, Zigbee, Radio Frequency Identification, WSN, Actuators.*

1. Introduction

Now days, IoT (Internet of Things) is a new revolution of the Internet and it provides a platform for communication between objects where objects can organize and manage themselves. Internet of Things (IoT) is the expansion of internet services because it allows daily life things to connect with user and operate remotely from anywhere. We can describe IoT in simple words, when the objects or things connected with each other using standard protocols and standard infrastructure so that they can communicate between each other and all these objects/things can be monitored and controlled by anywhere and anytime using internet. The IoT was began in the year 1998 and the term *Internet of Things* was first called by Kevin Ashton in 1999 [4].

The Internet of Things is a new area where it provides a privilege to communicate around the world. The objective of IoT is Anything, Anyone, Anytime, Anyplace, Any service and any network. Fig.1 describes the coupling of two things suppose its C's and A's which may be reveals, people and things can be connected Anytime, Anyplace, with Anything and Anyone, ideally by using in Any path/network and Any service. This implies addressing elements such as Convergence, Content, Collections (Repositories), Computing, Communication, and Connectivity in the context where there is seamless inter connection between people and things and/or between things and things so the A and C elements are present and tightly coupled [8].

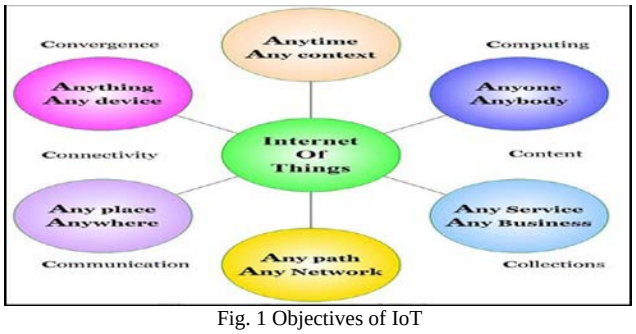

Fig. 1 Objectives of IoT

Following fig. 2 shows the methodology of IoT system or basic structure of IoT system.

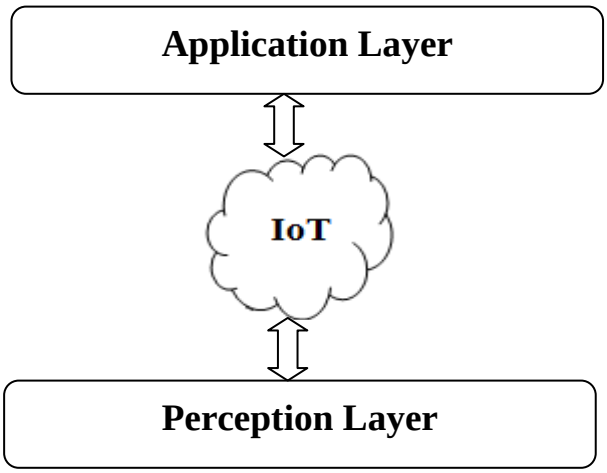

Fig. 2 Basic structure of IoT system

Fig. 2 consists of three layers: **Perception Layer**; main function of this layer is data acquisition interface and responsible for the integration and collaboration of various environments and collection of sensor data; **Network**

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Layer; this layer is nothing but the internet or IoT and provides interface between the Application layer and Perception Layer and application layer; **Application Layer** is smart system like Urban management, Green agriculture, industrial wireless sensor network or Industrial management, Environmental monitoring, Tele-medicine, Intelligent transportation and smart homes etc.

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, which is CPLD i.e. complex programmable logic device is adopted as the core controller which provides reading data in parallel and in real time with high speed on multiple different sensor data. Complex programmable logic device solved all previous problems like the current connect number, sampling rate, and signal types of sensors are generally restricted by the device means each sensor connected to the device is required to write complicated and cumbersome data collection program code. In this system the standard of IEEE1451.2 intelligent sensor interface specification are used so that system can collect sensor data intelligently. Fig. 3 shows the System's block function design.

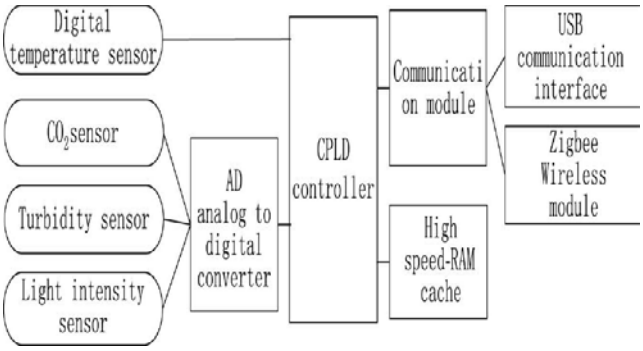

Fig. 3System's block function design [1].

This system is based on IEEE1451 protocol and by combining with CPLD and the application of wireless communication; it is very suitable for real-time and effective requirements of the high-speed data acquisition system in IoT environment. The system achieved good effects in practical application in taking real time monitoring of water environment in IoT environment as an example and also more flexible and extensible.

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

Cheong, P. et al. [3], paper presents a ZigBee-based wireless sensor network node for the ultraviolet i.e. UV detection of flame. This system is based on the sensor node; which is composed of a ZnSSe UV photo detector and also contains current-sensitive front end including a high-gain current-to-voltage amplifier with 120 dB and a logarithm converter, a transceiver operated at a 2.4-GHz industrial, scientific, and medical band. For converting the ultraviolet emission of flame into picoamperes the passive photo detector is designed or set in a such a way that it will having a cutoff at 360 nm and system can detect the flame at the speed of 70 ms. System also contains mixed signal processing for the speed of flame detection is as fast as 70 ms and ZigBee transmission provides send data from the sensor to the central processor system or to the application layer. The systems sensor node consumes only an average of 2.3 mW from a 3.3-V supply. This system is tested under the condition such that the luminous flame was imaged onto the sensor node with different angles ranging from -30° to 30° and distances of 0.1, 0.2, and 0.3 m enabling effective fire safety applications.

GauravTiwari and RiyazKazi [7], present Autonomic Smart Sensor Interface for Industrial in IOT Environment. Sensors are generally restricted by the device because of the current connect number, sampling rate, and signal

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types and if required to connect devices required to write complicated and cumbersome data collection programming code.to solve this problem this paper provides the new method i.e. design a functional smart sensor interface for industrial WSN in IoT environment, in this field programmable gate array device (FPGA) is adopted as a core-controller. Fig. 4a and 4b shows the proposed system i.e. Autonomic Smart Sensor Interface for Industrial in IOT Environment.

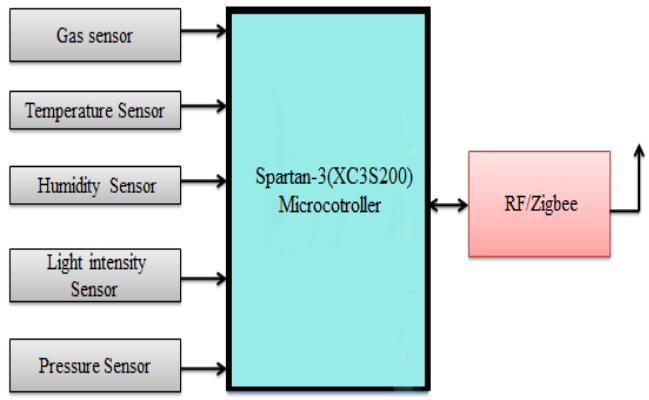

Fig. 4a Monitoring unit

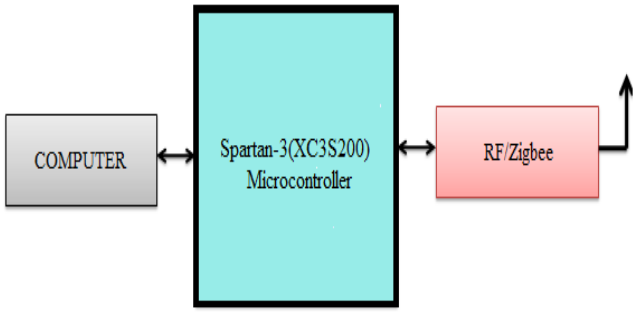

Fig. 4b Control unit

Field programmable gate array device read data in parallel and in real time with high speed on multiple different sensor data and the standard of IEEE1451.4 intelligent sensor interface specification is adopted for this design.

R. KarpagaPriya, T. KarpooraEswari, and K. Akilakumari [5], presents an Industrial WSN in IOT Environment Interface with Smart Sensor Using ARM. This system is to develop a sensor interface device is essential for sensor data collection of industrial Wireless Sensor Networks i.e. WSN in Internet of Things (IoT) environment. In the proposed system ARM is adopted as the core controller at the time of interfacing for industrial WSN in IoT atmosphere so that it will scan information in parallel and in real time with high speed on multiple completely different device information and for this Intelligent device interface specification is adopted. Different Sensors are used to provide the values of Temperature, Vibration, Gas present in the industrial environment, so that critical situation can be avoided and preventive measures are successfully implemented. The result of the system gives values of Temperature is 67.4c. If Vibration and Gas sensor is either Low or Medium, it means Low indicates that there is no gas and vibration, and then Medium indicates there is a Gas and Vibration present.

Bharani M., Elango S., Ramesh S.M., and Preetilatha R. [6], presents an embedded system based monitoring system for industries by interfacing sensors with ATmega Microcontroller. In this system various sensors are being used for measuring the temperature, pressure, gas etc. In the proposed system, sensors are interfaced with the microcontroller ATmega328p which provides a high-performance Atmel 8-bit AVR RISC-based microcontroller combines 32KB flash memory with read-while-write capabilities, 1024B EEPROM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable, a byte-oriented 2-wire serial interface, serial port, a 6-channel 10-bit A/D, programmable watchdog timer with internal oscillator, and five software selectable power saving modes. Using Zigbee the measured values are sent from monitoring station to the controlling station and then sent via WAN to the Internet if needed. Received values are compared with the threshold value if any mismatch is found then the workers will be informed to take corrective measures.

S.Pandikumar and R.S. Vetrivel [8], presents an IoT and GSM based design of smart home controlling system. This paper provides architecture, which enables the users to control and monitor smart devices through internet and also it creates an interface between users and smart home by using GSM and internet technologies, or it can say that it creates GSM based wireless communication from the web server into the smart home. Users give commands through web then the users inputs are converted into GSM-SMS commands, then these commands are sent to embedded system module. This embedded system directly connect with devices through GSM network, and finally the user commands are parsed and executed by microcontroller to control any electronic objects like home appliances, lights, etc and it sends the acknowledgement.

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4. Conclusions

Now a day applications of Internet are increasing and IoT is the new era of the internet where daily life all things connected to internet and can be monitor & can be operate remotely from anywhere. This paper provides objectives of IoT, most of the application domains where IoT is used and the system architecture of IoT. Literature Survey provides the different Iot based existing system and gives details about the system.

References

[1] Qingping Chi, Hairong Yan, Chuan Zhang, Zhibo Pang, and Li Da Xu, "A Reconfigurable Smart Sensor Interface for Industrial WSN in IoT Environment", IEEE Transactions on IndustrialInformatics, Vol. 10, NO. 2, MAY 2014, pp. 1417-1425.

[2] Shifeng Fang, LidaXu ; Huan Pei ; Yongqiang Liu ; Zhihui Liu ; Yunqiang Zhu ; Jianwu Yan ; and Huifang Zhang, "An Integrated Approach to Snowmelt Flood Forecasting in Water Resource Management", Industrial Informatics, IEEE Transactions, Volume:10 ,Issue: 1, April 2013, pp. 548 – 558.

[3] Cheong, P., Ka-Fai Chang, Ying-Hoi Lai, Sut-Kam Ho, Iam-KeongSou, and Kam-Weng Tam, "A ZigBee-Based Wireless Sensor Network Node for Ultraviolet Detection of Flame", Industrial Electronics, IEEE Transactions, Volume 58 , Issue: 11, February 2011, pp. 5271 – 5277.

[4] Dr. V. Bhuvaneswari, Dr. R Porkodi, "The Internet of Things (IoT) Applications and Communication Enabling Technology Standards: An Overview", International Conference on Intelligent Computing Applications, 2014, pp. 324-329

[5] R. KarpagaPriya, T. KarpooraEswari, and K. Akilakumari, "Industrial WSN in IOT Environment Interface with Smart Sensor Using ARM", International Journal of Advance Research in Science And Engineering (IJARSE), Vol. No.4, Special Issue (02), February 2015, pp. 204-215.

[6] Bharani M., Elango S., Ramesh S.M., and Preetilatha R., "An Embedded System Based Monitoring System For Industries By interfacing Sensors With ATmega Microcontroller" International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 3, Issue 11, November 2014, pp. 1472-1474.

[7] GauravTiwari, RiyazKazi,"Realization of the Functions of Autonomic Smart Sensor Interface for Industrial in IOT Environment", International Journal of Advanced Research in Computer Science and Software Engineering, (IJARCSSE) Volume 5, Issue 1, January 2015, pp. 878-883.

[8] S. Pandikumar and R.S. Vetrivel," Internet of Things Based Architecture of Web and Smart Home Interface Using GSM", International Journal of Innovative Research in Science, Engineering and Technology(IJIRSET), Volume 3, Special Issue 3 , March 2014, pp. 1721-1727.

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