International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

Towards an Efficient Interface for Industrial Wireless Sensor Networks

P. Ravali[1], G. Purna Chendar Rao[2]

[1]M. Tech Student, ECE, SVS Group of Institutions, Telangana, India

[2]Assisti.Prof, ECE, SVS Group of Institutions, Telangana, India

Abstract: ***With gradual improvement of people's ecological protection awareness, ecological monitoring is becoming an essential direction of WSN application in IoT atmosphere. Ecological monitoring has greater needs for equipment and much more complex ecological details are needed. A sensor interface system is required for sensor data assortment of industrial wireless sensor systems (WSN) in IoT conditions. However, the present connect number, sampling rate, and signal kinds of sensors are usually restricted through the device. A brand new technique is suggested to create a reconfigurable wise sensor interface for industrial WSN in IoT atmosphere, by which complex programmable logic device (CPLD) is adopted because the core controller. Thus, it may read data in parallel and instantly rich in speed on multiple different sensor data. The calibre of IEEE1451.2 intelligent sensor interface specs is adopted with this design. The unit is combined with latest CPLD technology and the calibre of IEEE1451.2 intelligent sensor specs.***

Keywords: IEEE1415 Protocol, Internet of Things (Iot), CPLD, Sensor Data Acquisition

1. Introduction

Wireless Sensor Systems (WSN) continues to be used to collect data about physical phenomena in a variety of programs for example habitat monitoring, and sea monitoring. Sensor interface system is required for discovering several types of sensor data of commercial WSN in IoT conditions. It allows us to get sensor data. Thus, we are able to better comprehend the outdoors atmosphere information. To satisfy the needs of lengthy-term industrial ecological data acquisition within the IoT, the purchase interface device can collect multiple sensor data simultaneously, to ensure that better and various data information could be collected from industrial WSN. In IoT atmosphere, different industrial WSNs involve lots of complex and various sensors. Simultaneously, each sensor features its own needs for readout and various customers their very own programs that need various kinds of sensors. It results in involve writing complex and cumbersome sensor driver code and knowledge collection methods for each sensor recently linked to interface device, that can bring many challenges towards the researches. Water atmosphere monitoring is among the IoT application fields, where complex water quality information, can be used to look for the water ecological quality simultaneously. However, presently, you will find couple of data collection products which are devoted to water quality monitoring available on the market. Such products can ensure high-speed of information acquisition for multiple sensors and adjust to complex as well as other sensor types well. Thus, we design and implement a WSN data acquisition interface you can use for water ecological monitoring. This paper designs and realizes a reconfigurable wise sensor interface for industrial WSN in IoT atmosphere. This design presents several benefits as described below. To begin with, CPLD can be used because the core controller to produce the restriction around the universal data acquisition interface, and realize truly parallel purchase of sensor data. It's not just enhanced the sensor data collection efficiency of commercial WSN, but additionally extended the applying selection of the information acquisition interface equipment in IoT atmosphere. Next, a brand new design technique is suggested within this paper for multi-sensor data acquisition interface that may realize plug and play for several types of sensors in IoT atmosphere. The look system is applicable the IEEE1451 interface protocol standard which is used for wise sensors of instantly finding network. For those sensors not according to IEEE 1415 protocol standard, the information acquisition interface system is capable of the part of plug and play. If there's information acquisition interface suitable for the sensor of every Application field in IoT. Rid of it greatly promotes IoT development. Which means this design combines with the calibre of IEEE1451.2 intelligent sensor protocol, so we design and implement a reconfigurable wise sensor interface for industrial WSN in IoT atmosphere. Within this paper, this design makes the most of CPLD qualities, for example high execution speed, flexible organization structure, IP design could reuse.

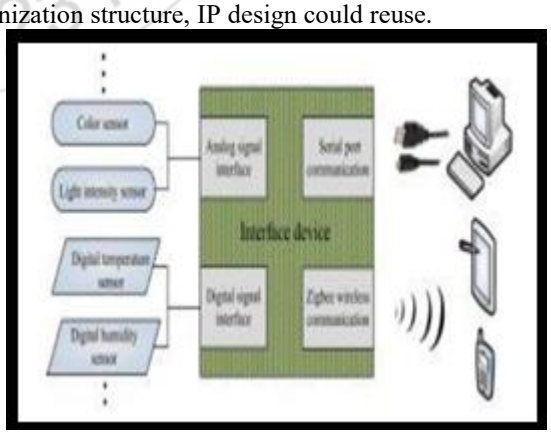

Figure: An overview of reconfigurable smart sensor interface device

2. Methodology

Being an emerging technology introduced about rapid advances in modern wireless telecommunication, Internet of

products (IoT) has attracted lots of attention and it is likely to bring advantages to numerous application areas including industrial WSN systems, and healthcare systems manufacturing. Using the advancements in Internet technologies and WSNs, a brand new trend is developing within the era of ubiquity. "IoT" is about physical products speaking to one another, where machine- to-machine (M2M) communications and person-to-computer communications is going to be extended to "things". Key technologies that drive the way forward for IoT are based on wise sensor technologies including WSN, nanotechnology, and miniaturization Meanwhile, these universal data acquisition connects are frequently restricted in physical qualities of sensors (the connect number, sampling rate, and signal types). Now, micro control unit (MCU) can be used because the core controller in mainstream data acquisition interface device. MCU has the benefit of low cost and occasional power consumption that makes it relatively simple to apply. But, it performs an activity by means of interrupt; making this multi-sensor acquisition connects not necessarily parallel in collecting multi-sensor data. Protocol standard have a superior cost but still lack recognition in industrial WSN in IoT atmosphere. Nonetheless, at the moment, good examples of intelligent sensors in the marketplace and compliant with this particular standard continue to be limited. To resolve these complaints, some devoted hardware connects in line with the IEEE 1451 happen to be lately suggested, and they're able to interfacing with various sensor typologies. These interface products are often according to relatively complex devoted electronic boards. It's apparent that such restriction ought to be launched, along with a reconfigurable multi-sensor data acquisition interface with higher compatibility and normative interface standard must be coded in IoT atmosphere. Since IoT is connected with a lot of wireless sensor products, it creates a large number of data. Sensor data acquisition interface equipment is among the key parts in IoT programs. Data collection may be the essential use of WSN and most importantly it's the first step toward other advanced programs in IoT atmosphere. IoT is really a major drive to aid service composition with assorted programs. The architecture of IoT is highlighted as with Fig. 1. It includes three layers: 1) perception layer 2) network layer and three) application layer. The style of data acquisition interface is principally put on the perception layer of IoT. The information acquisition interface accounts for the combination and collaboration of numerous conditions and assortment of sensor data. Perception layer of IoT is principally made up of sensors, RFID visitors, cameras, M2M terminals, as well as other data collection terminals.

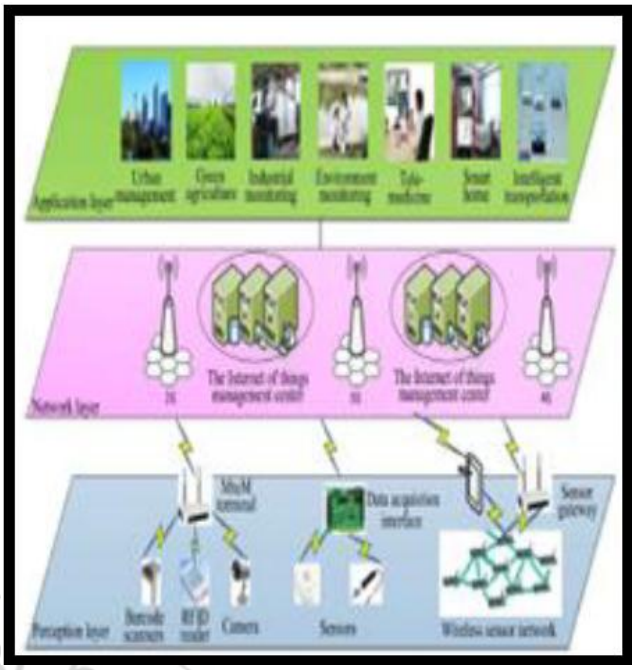

Figure: An overview of IoT

3. An Overview of Proposed System

WSN systems are very well-suited to lengthy-term industrial Ecological data acquisition for IoT representation. With rapid growth and development of IoT, major producers are devoted towards the research of multi-sensor acquisition interface equipment. There are plenty of information acquisition multiple- interface equipments with mature technologies available on the market. However these interface products are extremely focused on working style, so they aren't individually adaptable towards the altering IoT atmosphere. Sensor data acquisition surface device is paramount a part of study industrial WSN application. To be able to standardize an array of intelligent sensor connects on the market and solve the compatibility problem of intelligent sensor, the IEEE Electronic Engineering Association has additionally released IEEE1451 wise transducer (STIM) interface standard protocol suite for future years growth and development of sensors. This paper designs and realizes a reconfigurable wise sensor interface for industrial WSN in IoT atmosphere. This design presents several benefits as described below. To begin with, CPLD can be used because the core controller to produce the restriction around the universal data acquisition interface, and realize truly parallel purchase of sensor data. It's not just enhanced the sensor data collection efficiency of commercial WSN, but additionally extended the applying selection of the information acquisition interface equipment in IoT atmosphere. Next, a brand new design technique is suggested within this paper for multi-sensor data acquisition interface that may realize plug and play for several types of sensors in IoT atmosphere. We design a reconfigurable wise sensor interface device that integrates data collection, information systems, and wired or wireless transmission together. The unit could be broadly utilized in many application regions of the IoT and WSN to gather several types of sensor data instantly. We program IP core module of IEEE1451.2 corresponding protocol in the CPLD. Therefore, our interface device can instantly uncover sensors

linked to it, and also to collect multiple teams of sensor data intelligently, and parallel rich in-speed. When it comes to data transmission, our design is capable of wired communication through Hardware (USB) interface and wireless communication through Zigbee module. Therefore, we are able to distinct transmission mode from the device in numerous industrial application conditions. CPLD is core controller from the interface device. It's accustomed to control data acquisition, processing, and transmission intelligently, making some pre-processing work with the collected data. The motive force of chips around the interface system is also designed within the CPLD. The applying and dealing diagram from the reconfigurable wise sensor interface device. Used, the designed device collects analog signal trans-mitted from colour sensors, light intensity sensors, along with other similar sensors with an analog signal interface. It may also collect digital signal sent in the digital sensors, for example temperature sensors, digital humidity sensors, and so forth, via a digital signal interface. Multiple scalable connects are made around the equipment. It may be extended to eight- funnel analog signal interface and 24-funnel digital signal interface. This helps to ensure that our device can interact with numerous sensors among the use of industrial IoT or WSN and guarantees the varied assortment of the data.

4. Conclusion

This paper describes a reconfigurable wise sensor interface for industrial WSN in IoT atmosphere. The machine can collect sensor data intelligently. It had been designed according to IEEE1451 protocol by mixing with CPLD and the use of wireless communication. If you take real-time monitoring water atmosphere in IoT atmosphere for example, we verified the system accomplished good effects in request. Nonetheless, many interesting directions are remaining for more researches. The use of CPLD greatly simplifies the style of peripheral circuit, and helps make the whole system more flexible and extensible. Use of IEEE1451 protocol allows the machine to gather sensor data intelligently. Various kinds of sensors can be used lengthy because they are attached to the system. Primary design approach to the reconfigurable wise sensor interface system is described within this paper.

References

[1] O. Vermesan, P. Friess, P. Guillemin, S. Gusmeroli, H. Sundmaeker, and A. Bassi. et al. Eds., “Internet of things strategic research roadmap,” in Internet of Things: Global Technological and Societal Trends. Aalborg, Denmark: River Publisher, 2011, ch. 2, p. 52.
[2] P. Cheong et al., “A ZigBee-based wireless sensor network node for ultraviolet detection of flame,” IEEE Trans. Ind. Electron., vol. 58, no. 11, pp. 5271-5277, Nov. 2011. [40]W. Li et al., “The spreadsheet (TEDS) research in the IEEE1451 agree¬ment,” Comput. Knowl. Technol., vol. 3- 20, pp. 334-336, 2008
[3] Y. Chen and V. Dinavahi, “Multi-FPGA digital hardware design for detailed large-scale real-time electromagnetic transient simulation of power systems,” IET Gener. Transmiss. Distrib., vol. 7, no. 5, pp. 451^63, 2013
[4] Z. Hanzalek and P. Jurcik, “Energy efficient scheduling for cluster-tree wireless sensor networks with time-bounded data flows: Application to IEEE 802.15. 4/ZigBee,” IEEE Trans. Ind. Informat., vol. 6, no. 3, pp. 438-450, Aug. 2010
[5] A. Myaing and V. Dinavahi, “FPGA-based real-time emulation of power electronic systems with detailed representation of device characteristics,” IEEE Trans. Ind. Electron., vol. 58, no. 1, pp. 358-368, Jan. 2011
[6] L. Ren, L. Zhang, F. Tao, X. Zhang et al., “A methodology towards virtualization-based high performance simulation platform supporting mul¬tidisciplinary design of complex products,” Enterp. Inf. Syst., vol. 6, no. 3, pp. 267- 290, 2012
[7] Z. Pang et al. , “Ecosystem analysis in the design of open platform- based in-home healthcare terminals towards the internet-of-things,” in Proc. IEEE 15th Int. Conf. Adv. Commun. Technol. (ICACT), 2013, pp. 529-534