ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

Industrial Safety Parameters Monitoring in IOT Environment

Kallappa[1], B. B. Tigadi[2]

PG Student, Dept. of DECS, Marata Mandal Engineering College Belgaum, Karnataka, India[1]

Assistant Professor, Dept. of ECE, Marata Mandal Engineering College Belgaum, Karnataka, India[2]

ABSTRACT: The proposed system develops a sensor interface device essential for sensor data acquisition of industrial Wireless Sensor Networks (WSN) in Internet of Things (IoT) environment. It is planned to style a re-configurable sensible device interface for industrial WSN in IoT atmosphere, during which ARDUINO UNO is adopted as the core controller. Thus, it will scan information in parallel and in real time with high speed on multiple completely different device information. Intelligent device interface specification is adopted for this style. The device is combined with the most recent ARM programmable technology and intelligent device specification. By detecting the values of sensors it can easily find out the Temperature, humidity, and gas present in the industrial area. And also it controls the power with abnormalities. So that critical situation can be avoided and preventive measures are successfully implemented. It is the most effective and most economical means of equipment safety monitoring. So it has very good social prospects.

KEYWORDS: Wireless Sensor Networks (WSN), Internet of Things (IoT), Sensors, Sensor data acquisition**,** Arduino Uno Controller.

I. INTRODUCTION

Now- a – days, the industrial monitoring field requires more manual power to monitor and control the industrial parameters such as temperature, humidity, gas etc. this is the most upcoming issues in the industrial sectors. if the parameters are not monitored and control properly, it leads to a harmful situation. Most of the industries are facing those kinds of situation because of some manual mistakes. To overcome manual mistakes we are using industrial automation with internet of things. WIRELESS SENSOR NETWORKS (WSN) has been employed to collect data about physical phenomena in various applications such as habitat monitoring, and ocean monitoring, and surveillance[1]-[3]. As an emerging technology brought about rapid advances in modern wireless telecommunication, Internet of Things (IoT) has attracted a lot of attention and is expected to bring benefits to numerous application areas including industrial WSN systems, and healthcare systems manufacturing[4],[5].WSN systems are well-suited for long-term industrial. There is a growing interest in using IoT technologies in various industries. A number of industrial IoT projects have been conducted in areas such as agriculture, food processing industry, environmental monitoring, security surveillance, and others. There has been much research and various attempts to apply new IoT technology to industrial areas. IoT provides a promising opportunity to build powerful industrial systems and applications by leveraging the growing ubiquity of radio frequency identification (RFID) and wireless, mobile and sensor devices. A wide range of industrial IoT applications have been developed and deployed in recent years. In an effort to understand the development of IoT in industries.

II. LITERATURE REVIEW

The practical realization of a full-custom, reusable WSN platform suitable for use in low cost long-term IoT environmental monitoring applications. For a consistent design, the main application requirements for low cost, fast deployment of large number of sensors, and long unattended service are considered at all design levels. Various trade-offs between platform features and specifications are identified, analyzed, and used to guide the design decisions. The development methodology presented can be reused for platform design for other application domains, or evolutions of

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

this platform [6]. Every device capable of connecting to the internet, such as smart-phones, laptops, tablets, desktops, routers, internet radios, internet TVs, etc., requires a unique IP address. The current widely deployed IP revision is IPv4, which has a 32-bit address-space, or approximately 4.3 billion unique IP addresses, a number much smaller than the world population today. The 32-bit address space of IPv4 has already been exhausted and succeeded by a sixth revision, IPv6, with a much wider address-space. IPv6 plays a very important role in the IoTs due to its very wide 128-bit address-space capable of addressing over $3.4x10^{38}$ unique addresses. Fig 1 shows detailed architecture of IoT.

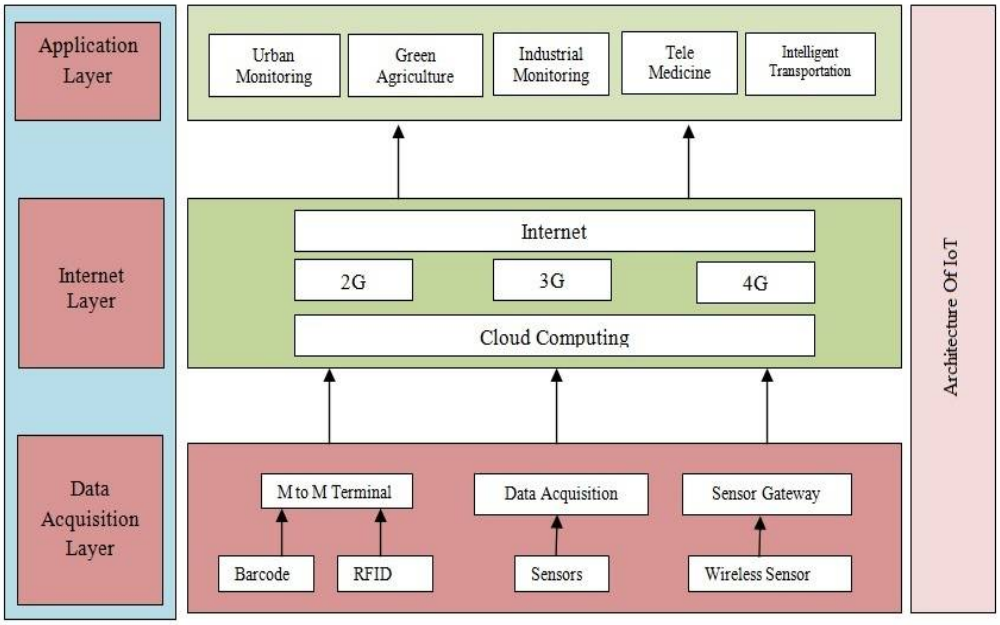

Fig 1 Architecture of IoT

To coverage internet of thing devices with corporate IT solutions, teams require a reference architecture for the Internet of Things. The reference architecture must include devices, server-side capabilities, and cloud architecture required to interact with and manage the devices. The architecture of IoT given by ITU can be divided into three layers from the bottom up: Data Acquisition layer, Internet layer and application layer. Figure shows the three-layer architecture of the Internet of Things. Reference architecture should provide architects and developers of IoT projects with an effective starting point that addresses major IoT project and system requirements. Data Acquisition Layer: also named as intelligent collection layer, including infrared sensors, human inductors, GPS, camera, sensors, terminal, sensor network, and so on. Its main function is to identify objects and collect information, which is similar to the function of skin and facial features of human body.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

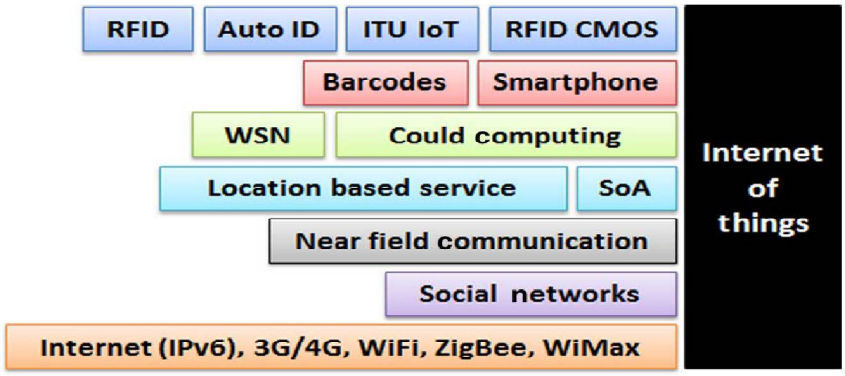

Fig 2 Technologies associated with IoT

Internet Layer: also known as access and transport layers, including the integration network of communication and Internet, network management center, information center, intelligent disposal center and other platforms. Its main function is to transmit and process the information collected by the Acquisition layer, which is similar to the function of human nervous system and brain of human body. Application Layer: also known as processing and decision-making layer, which is the interface of IoT and user (people, organizations and other systems). Also, it is the depth integration of IoT technology and industry expertise. Application layer needs to combine with the industry needs to complete information intelligence, which is similar to the social division of labor, and ultimately form the human society. Fig 2 shows technologies associated with IoT. Internet of things (IoT) enabled users to bring physical objects into the sphere of cyber world. This was made possible by different tagging technologies like NFC, RFID and 2D barcode which allowed physical objects to be identified and referred over the internet. There are some technologies which are made objects connected to cyber world. There is a growing interest in using IoT technologies in various industries [10]. A number of industrial IoT projects have been Conducted in areas such as agriculture, food processing industry, environmental monitoring, security surveillance, and others. Meanwhile, the number of IoT publications is quickly growing [11].The advances in both RFID and WSN significantly contribute to the development of IoT. Zegbee and GSM based monitoring systems lacks in range and speed respectively. Systematic process is need for monitoring the industrial parameters. Since, they have to follow the cycles of automation and recycling, in order to obtain a good yield. Recent technology is working in IoT & WSN using we can reconfigure every individual parameter.

III. METHODOLOGY

The hardware unit of the prototype of the system is represented by the block diagram below. It contains ARDUINO UNO (ATmega328) Microcontroller as the main processing unit.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

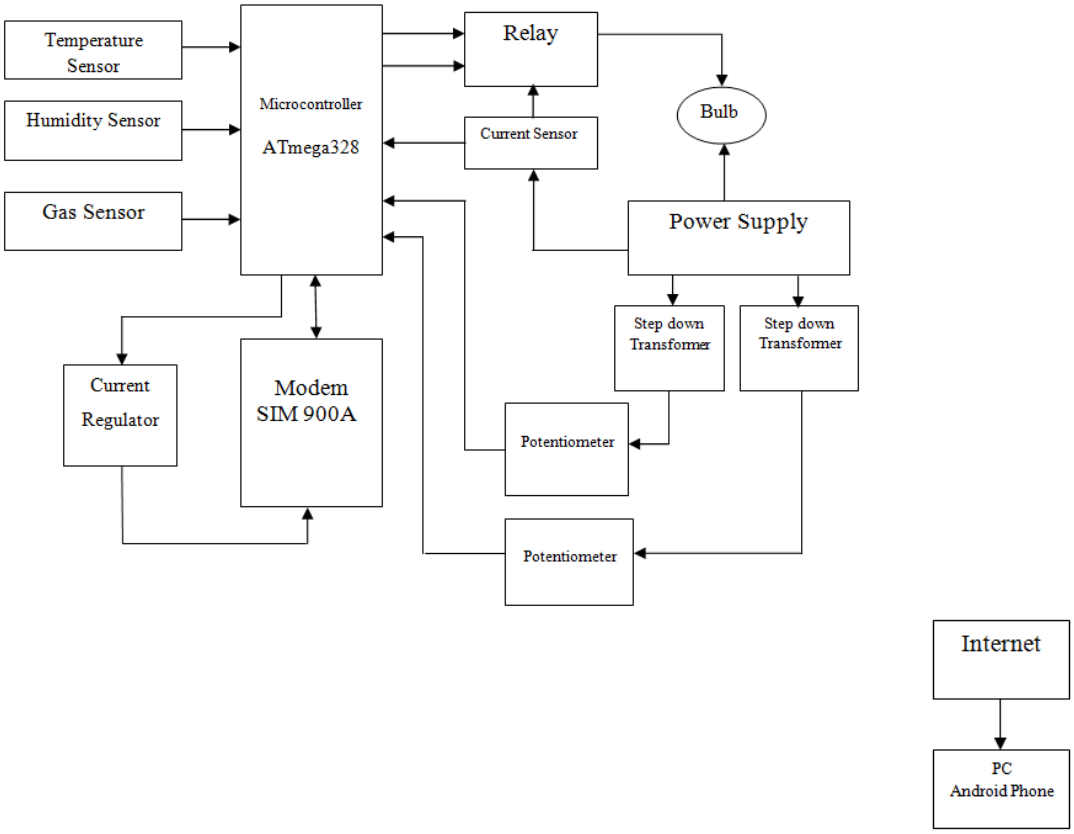

Fig 3 Block Diagram of Proposed system

The system consist of two units: Sensor unit, Server unit

- Sensor unit consists of Micro controller, sensors like temperature sensor, humidity sensor, gas sensor, current sensor.
- Server unit consist of computer.
- Power management unit consists of relays, potentiometers, step down transformers.
- Current regulator used to regulates the current to modem to operating current range 2Amps.

The general block diagram of the system is as shown in figure above. In web base substation monitoring, the various parameter such as voltage, current, humidity, level and temperature is sensed by their related sensor. For ex. Temperature is sensed by temperature sensor for e.g. (LM35).Humidity sensor module, the output produced by sensor is in the form of voltage or current. Current is sensed by current transducer and humidity sensor is used to sense the moisture level & voltage is directly checked across the load. This all quantities are in analog form. This can never read by microcontroller. So all these analog signal are converted into digital signal by the use of inbuilt ADC . These digital formed signals are transferred to the microcontroller. Simultaneously all these parameters are send to PC/laptop and Android Mobile by interfacing a GPRS modem. Microcontroller ATmega328 is heart of whole system, if the microcontroller fails to work by any mean, then the whole system will not work. Sensors values will read directly by microcontroller. And power management unit works on relays and potentiometers. If any abnormalities found in power source it can be automatically shifted to normal one. In this project, we are considered the same power supply as two power sources by making reference values. Apart from this, to gain the knowledge of ATmega328 microcontroller, GSM modem and the way in which these can be used to control the devices using uart protocol. The design is based on ATmega328 integrated with AVR processor, which is a member of the AVR family of general-purpose 8-bit microprocessors. The AVR family offers high performance for very low-power consumption and gate count. SIM card is used in the modem. GPRS modem can be controlled by standard set of AT (Attention) commands.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

IV.IMPLEMENTATION AND RESULTS

In this project there is no need of converting analog signal into digital signal of sensors because ARDUINO UNO Microcontroller consists of in-built analog to digital converter. So now interface temperature sensor, Humidity Sensor, GSM communicate with the controller and controlling all sensors for process requirement. The Operations performed in the block performed can be classified as Sensor unit and Server unit. The on-board processor will perform both these operations in order to provide safety to the industrial parameters.

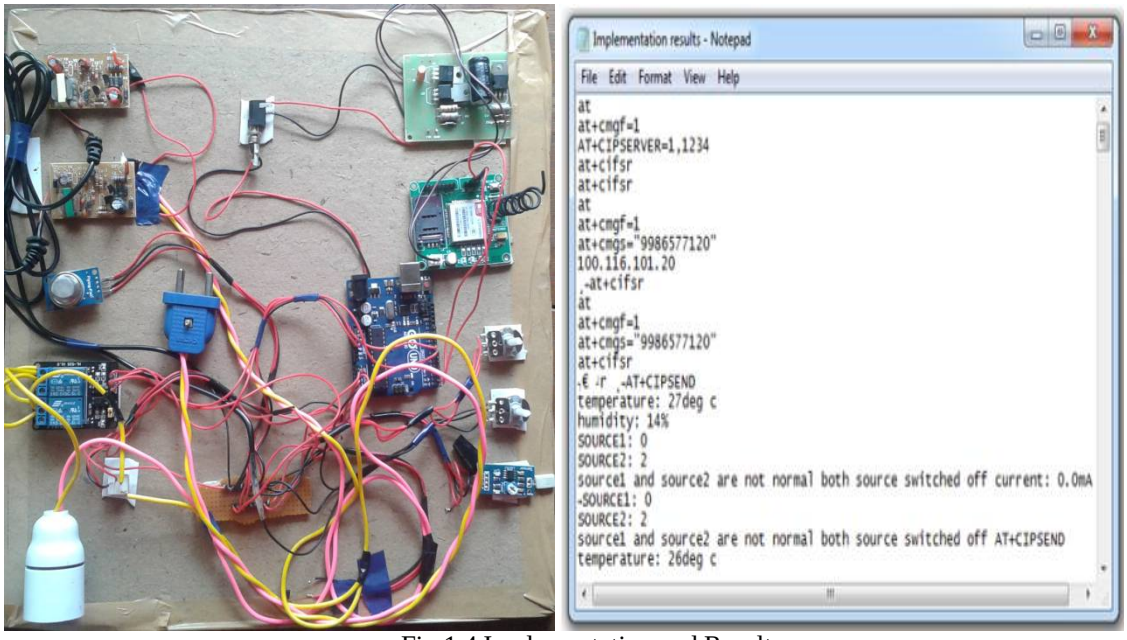

Fig 1.4 Implementation and Results

V. CONCLUSION

This paper describes a IOT Based Reconfigurable smart WSN unit for industrial safety parameters monitoring. The system can collect sensor data intelligently. It was designed based on 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 application of ARDUINO UNO greatly simplifies the design of peripheral circuit, and makes the whole system more flexible and extensible. Different types of sensors can be used as long as they are connected to the system. Main design method of the reconfigurable smart sensor interface device is described in this paper. Finally, by taking industrial safety parameters monitoring in IoT environment as an example, we verified that the system achieved good effects in practical application. Nevertheless, many interesting directions are remaining for further researches in the area of WSN in IoT environment.

VI.FUTURE SCOPE

The proposed system does the reconfiguration of the sensors threshold values. There is scope for development of an environment which can be automatically controlled based on the alerts from the monitoring system. For example, when the temperature exceeds the threshold value that is set, coolers will be turned on automatically to required temperature.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

REFERENCES

[1] S. Li, L. Xu, X. Wang, and J. Wang, "Integration of hybrid wireless networks in cloud services oriented enterprise information systems," Enterp. Inf. Syst., vol. 6, no. 2, pp. 165–187, 2012.
[2] Q. Li, Z. Wang, W. Li, J. Li, C. Wang, and R. Du, "Applications integration in a hybrid cloud computing environment: Modelling and platform," Enterp. Inf. Syst., vol. 7, no. 3, pp. 237–271, 2013.
[3] L. Wang, L. D. Xu, Z. Bi, and Y. Xu, "Data cleaning for RFID and WSN integration," IEEE Trans. Ind. In format., vol. 10, no. 1, pp. 408–418, Feb. 2014.
[4] Y. Fan, Y. Yin, L. Xu, Y. Zeng, and F. Wu, "IoT based smart rehabilitation system," IEEE Trans. Ind. Informat., vol. 10, no. 2, pp. 1568–1577, 2014.
[5] W. He, G. Yan, and L. Xu, "Developing vehicular data cloud services in the IoT environment," IEEE Trans. Ind. Informat., vol. 10, no. 2, pp. 1587–1595, 2014.
[6] Mihai T. Lazarescu, "Design of a WSN Platform for Long-TermEnvironmental Monitoring for IoT Applications" IEEE Journal on emerging and selected topics in circuits and systems, vol. 3, no. 1, March 2013
[7] Ahmad El Kouche"Towards a Wireless Sensor Network Platform for the Internet of Things", IEEE ICC 2012 - Ad-hoc and Sensor Networking Symposium
[8] E.J. Duarte-Melo and M. Liu, "Data-Gathering Wireless Sensor Networks: Organization and Capacity," Computer Networks, vol. 43, pp. 519-537, 2003
[9] Siyuan Chen, Minsu Huang, Shaojie Tang, Yu Wang, "Capacity of Data Collection in Arbitrary Wireless Sensor Networks", IEEE transactions on parallel and distributed systems, vol. 23, no. 1, January 2012.
[10]Y. Li, M. Hou, H. Liu, and Y. Liu, "Towards a theoretical framework of strategic decision, supporting capability and information sharing under the context of Internet of Things," Inf. Technol. Manage., vol. 13, no. 4, pp. 205–216, 2012.
[11] Li Da Xu, Wu He, and Shancang Li, "Internet of Things in Industries: A Survey", IEEE transactions on industrial informatics, vol. 10, no. 4, November 2014.
[12] D.Uckelmann, M. Harrison, and F. Michahelles, "An architectural approach towards the future internet of things," in Architecting the Internet of Things. D. Uckelmann, M. Harrison, and F. Michahelles, Eds., New York, NY, USA: Springer, 2011, pp 1–24.