International Journal of Scientific Engineering and Technology Research

ISSN 2319-8885
Vol.05,Issue.19
July-2016,
Pages:3842-3845

www.ijsetr.com

Wireless Sensor Network for Industrial Environment Monitoring in IoT Applications

L. SILPA[1], H. CHANDRA SEKHAR[2]

[1]PG Scholar, Dept of ECE, VEMU Institute of Technology, P.Kothakota, Chitoor, AP, India,
E-mail: silpa.shil@gmail.com.

[2]Associate Professor, Dept of ECE, VEMU Institute of Technology, P.Kothakota, Chitoor, AP, India,
Email: chandrasekhar703@gmail.com.

Abstract: In proposed system we overcome disadvantage of existing system by scheduling tasks of the systems on a single chip using internet connection between heterogeneous multi-core systems. In our system we use arm 7 micro controller which supports operating system acts as core unit performing multi-tasking each task assigned with same priority. Here our application performs two tasks towireless networks having same priority.The sensors continuously transmits data to controller. The controller transmits data which is coming from sensors to PC using Zigbee as well as to server through internet by using http. "Http" is a protocol through which users can upload files from their systems to server. Once data is placed at server we can view the data at remote pc (with internet) on web page with unique ip address provided. RFID reader and tag is used to provide secured access to authorized persons. We can view continuous streaming of temperature, CO2, and LDR data. Along with the data acquisition we can also monitor the devices status and control the devices through pc via zigbee.

Keywords: LPC2148 Development Board, Zigbee Module, Sensors, GPRS, RFID Reader.

I. INTRODUCTION

Wireless sensor Networks (WSN) are employed to gather data regarding physical phenomena in various applications like habitat monitoring, and ocean monitoring, and surveillance. As arising technology brought about rapid advances in fashionable wireless telecommunication, Internet of Things (IoT) has attracted plenty of attention andis expected to bring advantages to varied application areas together with industrial WSN systems, and healthcare systems producing. WSN systems are well-suited for long industrial environmental data acquisition for IoT representation. Sensor interface device is important for detecting aried kinds of sensor data of commercial WSN in IoT environments. It allows us to acquire sensor knowledge. Thus, we will better understand the outside environment info. However, so as to fulfill the necessities of long industrial environmental data acquisition within the IoT, the acquisition interface device will collect multiple sensor data at a similar time, so a lot of correct and numerous knowledge information will be collected from industrial WSN. First of all, CPLD is used as the core controller to release the restriction on the universal data acquisition interface, and realize truly parallel acquisition of sensor data. It has not only improved the sensor data collection efficiency of industrial WSN, but also extended the application range of the data acquisition interface equipment in IoT environment. Secondly, a new design method is proposed in this paper for multi-sensor data acquisition interface that can realize plug and play for various kinds of sensors in IoT environment. The design system applies the IEEE1451 interface protocol standard that is used for smart sensors of automatically discovering network.

II. DESIGN OF PROPOSED SYSTEM

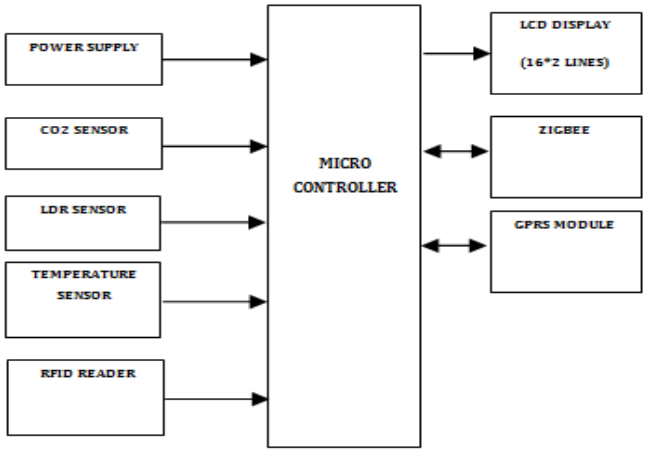

Fig.1.Transmitting section.

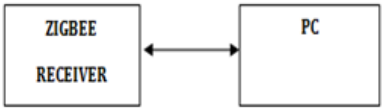

Fig.2. Monitoring section.

The design of entire system consisted of two part which are hardware and software. The hardware is designed by the rules of embedded system, and the steps of software consisted of three parts as shown in Figs.1 and 2. Zigbee based wireless technology which consists of transmitter at the

site location and receiver at control panel. Information received at the receiver will be send to the PC through Zigbee. So the people living at home with internet connection can see the received data. The system uses a compact circuitry built around LPC2148 (ARM7) microcontroller Programs are developed in Embedded C. Flash magic is used for loading programs into Microcontroller.

III. HARDWARE SYSTEM COMPONENTS

A. Micro Controller

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer(CISC) designs.

B. Liquid-Crystal Display

LCDis a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. Lcds are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

C. Thermistor

Thermistors are a temperature sensing device. It is used to sense the temperature. In this project by depends on the value of temperature the exhaust fan will run.

D. LDR

The LDR is used to measure the light intensity. According to that the sensed information is given to Microcontroller which will send to monitoring section through zigbee.

IV. EXPLANATION OF HARDWARE COMPONENTS

A. Thermistor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in ^{o}C) The LM35 - An Integrated Circuit Temperature Sensor You can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation, etc. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. It has an output voltage that is proportional to the Celsius temperature as shown in Fig.1. The scale factor is .01V/^{o}C The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4 ^{o}C at room temperature and +/- 0.8 ^{o}C over a range of 0 ^{o}C to +100 ^{o}C. Another important characteristic of the LM35DZ is that it draws only 60 micro amps from its supply and possesses a low self-heating capability. The sensor self-heating causes less than 0.1 ^{o}C.

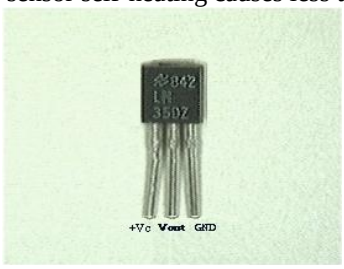

Fig.3.LM35 temperature sensor.

B. LDR

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically. The animation opposite shows that when the torch is turned on, the resistance of the LDR falls, allowing current to pass through it as shown in Fig.4.

Fig.4. LDR Sensor.

This is an example of a light sensor circuit: When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Consequently the LED does not light. However, when light shines onto the LDR its resistance falls and current flows into the base of the first transistor and then the second transistor. The LED lights on as shown in Fig.5. The preset resistor can be turned up or down to increase or decrease resistance, in this way it can make the circuit more or less sensitive.

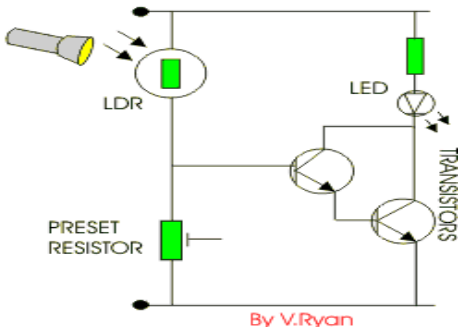

Fig.5. LDR Circuit diagram.

C. CO2 Sensor

A carbon dioxide sensor or CO_2 sensor is an instrument for the measurement of carbon dioxide gas. The most common principles for CO_2 sensors are infrared gas sensors and

chemical gas sensors as shown in Fig.6. Measuring carbon dioxide is important in monitoring indoor air quality.

Fig.6. CO2 Sensor.

D. ZIGBEE

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this ase is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The below table gives the pin description of transceiver. Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.

E. GPRS

General Packet Radio Service (GPRS) is a packet-data technology that allows GSM operators to launch wireless data services, such as e-mail and Internet access. As a result, GPRS provides operators with the ability to use data to drive additional revenue. GPRS is often called a 2.5G technology because it is a GSM operator's first step toward third generation (3G) and a first step in wireless data services. Although GPRS is a data-only technology, it helps improve GSM voice capacity. When an operator deploys GPRS, it also can upgrade to a vo-coder, a new type of voice coder that turns voice into digital signals before they pass across the wireless network. The vo-coder uses Adaptive Multi-rate speech trans coding (AMR) technology, which can handle twice as many simultaneous voice calls as a network that uses the old vo-coder. As a result, GPRS allows GSM operators to accommodate additional voice traffic without the expense of acquiring additional spectrum. GPRS supports peak download data rates of up to 115 kbps, with average speeds of 40 to 50 kbps, which is comparable to other 2.5G technologies, such as CDMA2000 1x. GPRS speeds are fast enough for applications such as Multimedia Messaging Service (MMS) and a web browsing experience comparable to a wired dial-up modem. GPRS also allows customers to maintain a data session while answering a phone call, which is a unique and exclusive feature to GSM. GPRS also provides an always-on data connection, so users do not have to log on each time they want data access. The packet architecture also means that users pay only for the data itself rather than for the airtime used to establish a connection and download data. GPRS is the most widely supported packet-data wireless technology in the world. Like GSM, GPRS supports international roaming so customers can access data services whether they are at home or abroad. When users travel to areas that have not yet been upgraded to GPRS, they still can access many data services via circuit-switched GSM.

V. RESULTS

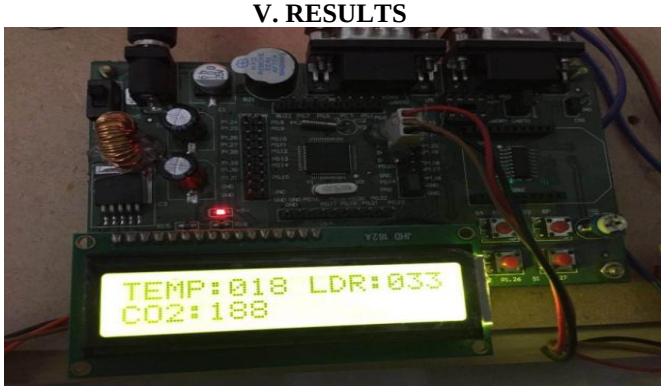

Fig.7.The temperature, LDR and Co2 values display on LCD.

Here all Temperature, LDR Sensor, Co2 sensors are controlled by Microcontroller ARM-7 LPC2148. This all values exceeds the threshold value then it display on LCD as well as Buzzer indication will be given as shown in Figs.7 to 10.

Fig.8. GPRS tracking system is connecting to post output values in website at unique address.

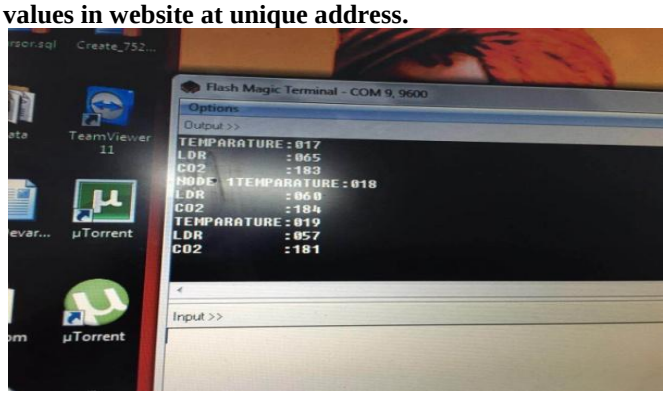

Fig.9. The temperature, LDR and Co2 values continuous streaming on Monitor through ZIGBEE Communication.

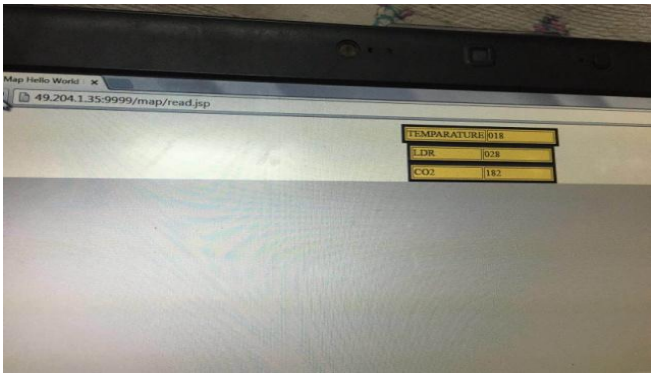

Fig.10. Here temperature, LDR and Co2 values posted in website which can monitor from anywhere on earth, if internet is present.

VI. CONCLUSION

This design is based on ZigBee and GPRS technology. The main purpose of this paper is to control the industrial appliance remotely from monitoring section. The host can know information from anywhere as all the information is posted in web page. The host control according to the condition given by the host control that particular device. The important aim of this project is to detect the person (or) any damage of the industrial equipment and also can monitor results in web pages continuously.

VII. REFERENCES

[1] Texas Instruments, Inc., "OMAP3 Platform," technical report, TexasInstruments, http://www.ti.com/lit/ml/swpt024b/swpt024b.pdf, 2009.

[2] Texas Instruments, Inc., "OMAP4 Platform,"Technical report,TexasInstruments,http://www.ti.com/lit/ml/swpt034b/swpt034b.pdf, 2011.

[3]Qualcomm,Inc.,"Snapdragon,"technicalreport, Qualcomm, http://www.qualcomm.com/media/documents/snapdragons4-processors-system-chip-solutions-new-mobile-age, 2011.

[4] S. Kato, K. Lakshmanan, R. Rajkumar, and Y. Ishikawa, "Timegraph:Gpu Scheduling for Real-Time Multi-Tasking Environments,"Proc. USENIX Ann. Technical Conf., 2011.

[5] Y.-S. Chen and L.-P. Chang, "A Real-Time Configurable Synchronization Protocol for Self-Suspending Process Sets," Real-TimeSystems, vol. 42, no. 1, pp. 34-62, 2009.

[6] L. Benini, D. Bertozzi, A. Guerri, and M. Milano, "Allocation, Scheduling and Voltage Scaling on Energy Aware MPSoCs," Proc.Conf. Integration of AI and OR Techniques in Constraint Programmingfor Combinatorial Optimization Problems, 2006.

[7] C.-F. Kuo and Y.-C. Hai, "Real Time Task Scheduling on Heterogeneous Two-Processor Systems," Proc. Conf. Algorithms and Architectures for Parallel Processing, 2010.

[8] B. Andersson, G. Raravi, and K. Bletsas, "Assigning Real-Time Tasks on Heterogeneous Multiprocessors with Two Unrelated Types of Processors," Proc. Conf. Real-Time Systems Symp., 2010.

[9] J. Rosen, P. Eles, Z. Peng, and A. Andrei, "Predictable Worst-Case Execution Time Analysis for Multiprocessor Systems-on-Chip,"Proc. IEEE Int'l Symp. Electronic Design, Test and Application, 2011.