SENSOR NETWORK FOR ENVIRONMENT MONITORING SYSTEM USING IOT AND DEVICE CONTROL SYSTEM

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ABSTRACT

The system is combined with the microcontroller programmable technology and intelligent device specification. By detecting the values of sensors it can easily find out the temperature, light, gas present in the given area. So that critical condition can be avoided and preventive measures are successfully implemented.In system zigbee is used as wireless module at both ends for transferring the data from one section to other section. This paper deals with industrial environment monitor and device control using microcontroller. In industries there is need for data monitoring and supervisory control which overcomes human intervention as well as overall efficiency and safety.Performance of the proposed system is verified and good effects are achieved in practical application.A new design method is proposed in this paper is that the multisensors are controlled using the single system.This paper presented different technologies, parameters to analyze environment.A sensor interface device is important for sensor data collection.

KEYWORDS: ARM Controller, Internet of Things, Sensors, wireless module.

INTRODUCTION

A sensor is a device that detects changes in quantities and provides a corresponding output.The proposed system is combined with the ARM technology and the intelligent sensor network for monitoring purpose.Lots of complication is involved in industrial automation across some sites located far away from each other especially it is complicated to consolidate status and control each unit by manual operation over wired network. For that to simplify the operation there is requirement of intelligent system with wireless networking. In this proposed system, to solve these problems, a new method is proposed to design a smart sensor interface for sensor network in Internet of Things, in which LPC 2148 microcontroller is adopted as the core controller. By using zigbee technology it can send the sensors data to computer. Sensor network is used to monitor industrial environment continuously.Different sensors used to monitor the conditions inside the area. This systemuse to collect the sensor data without loss and response in real time environment. The purpose of this proposed system is to make it easy for the user to view the current temperature, light and gas status in given area. It is suitable for enhancing security in industrial condition by remotely monitoring various industrial applications.This system shows a construction and working of simple, easy to use. It also shows cost effective environment monitoring system which runs on power supply.This proposed system also concludes that user can set limit range of the system parameters and if these parameters go beyond that value, it will turn on or off devices.Likewise, the process repeats every time, to monitor the industry without human involvement. Internet of Things is the network of physical objects like devices embedded with software, sensor and network connectivity that enables this objects to collect and exchange data.Computer communication systems and especially the internet are playing an important role in the daily life. Wireless

sensor network solutions can be mainly successful in providing an effective approach to data collection and transport for overall plant efficiency.

RELATED SYSTEM

Monitoring the quality of the any resources is essential need to avoid critical effect on human life. Kunal Dhodapkaret al. [2] presented system to construct a simple and effective environment monitoring system for both industrial as well as day to day use for people. It uses two sensors.V. Ramya et al. [7] proposed method to develop microcontroller based toxic gas detecting and alerting system in the given fields.M. Haefke et al. [8]proposed system for the environment monitoring station consists of core controller based measuring parameters which collect the value of the temperature, relative humidity and sunlight. These units send their data wirelessly to a station. K. Prathihastha et al. [5] presented system that deals with the design and development of wireless sensor node for wireless sensor network for monitoring the industrial parameters. Santosh. B. Panjagal et al. [6] measured and monitored the concentration levels of different greenhouse gases at the industry and the landfill site is the major concern. It is designed to monitor the leachate, a toxic liquid released at the landfill sites. The system is built around microcontroller, which processes the concentration level of greenhouse gases and monitors conditions around the industry and landfill sites. Bharani M. et al. [3] developed system for monitoring large scale industries and nuclear power plants, periodic transmission of accurate and reliable measurements is central to safe, efficient and economic operation. Qingping Chi et al. [1] proposed a system to develop a reconfigurable smart sensor interface for industrial sensor network in Internet of Things environment, which is complex programmable logic device, is used as the core controller.

PROPOSED METHOD

The proposed system includes the collection of sensors data from various sensors of environment like temperature sensor, carbon monoxide sensor and light sensor. The signals of sensors undergo signal conditioning to convert the signals from analog to digital. The LPC2148 microcontroller used belongs to ARM7 family. It processes the data and displays the parameters on the LCD. The proposed system mainly contain the sensor unit, signal conditioning circuitry, microcontroller, xbee module and other components shown in block diagram of proposed system.
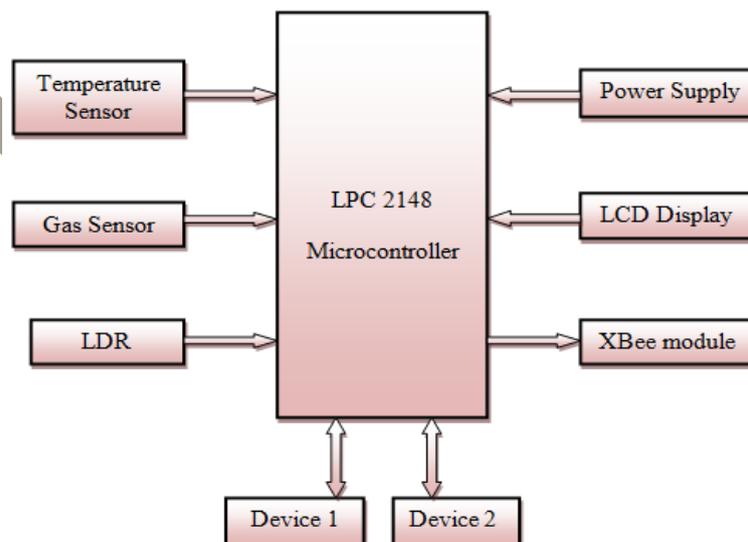

Fig.1.Block diagram of Transmitter section

The proposed system is presented into two sections. First section contains different sensors like temperature, light and gas. In this sensor node microcontroller collects the sensor data from sensors and processes them and fed to the xbee wireless transmitter which will send the information to the transmitter section.This may be preferably places at required locations like industry. The transmitter section consists of xbee receiver and laptop which will collects the sensor information from transmitter section and uploaded in to the server. The wireless modules operate within thezigbee technology and support the unique needs of low cost, low power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between two sections. The modules operate within 2.4 GHz frequency band.Two wireless modules are used for the transmitter and the receiver.
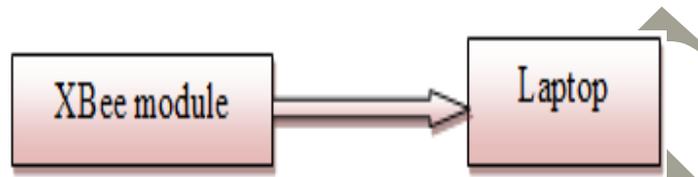

Fig.2.Block diagram of Receiver section

Microcontroller is responsible for collecting environmental information such as temperature, light, gas, etc. and it isresponsible for controlling and managing devices connected to the system. The purpose of this system is to present control theory that is relevant to the analysis and design of microcontroller based system. LCD display section is basically meant to show up the status of the work. This work makes use of liquid crystal display to display for sensor output values. Sensitive material of MQ-7 gas sensor is SnO2,it has lower conductivity in clean air. When the target gas exist, the sensor's conductivity is higher along with the gas concentration rising. This sensor has a high sensitivity and fast response time.
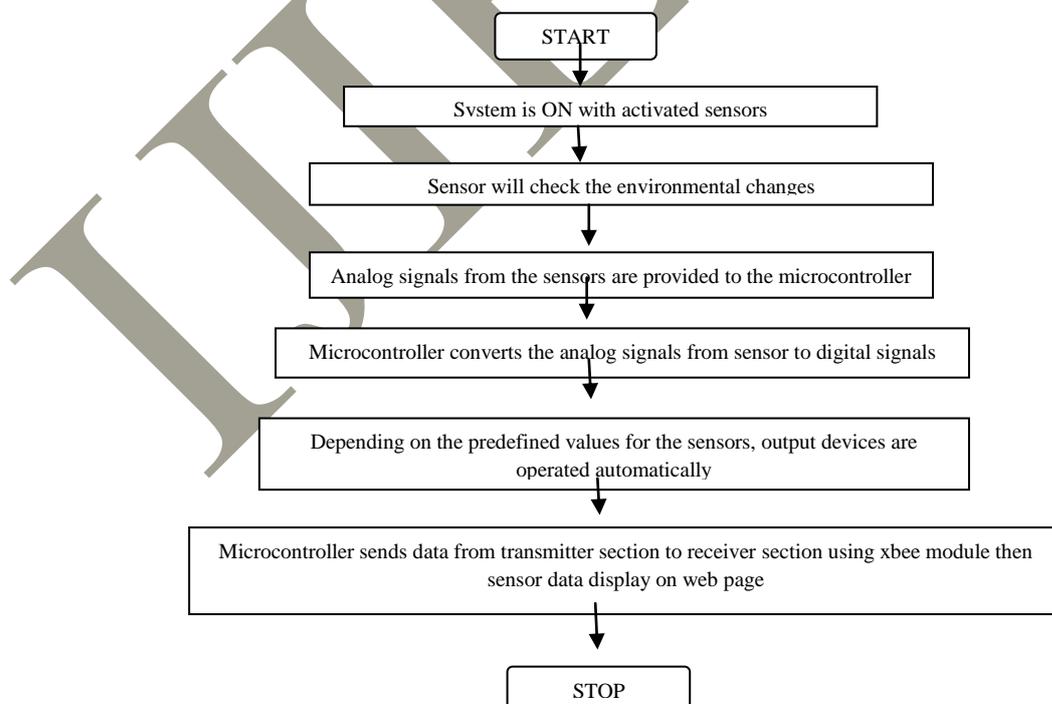

Fig. 3. Flow chart of the execution steps for the proposed system

The flow chart in the Fig. 3 above is representing the flow of execution for the automated monitoring and controlling of environment by designed system. The system is designed in such a way to execute in the following steps that, it will first check for sensor inputs continuously and provide it to microcontroller as well. Microcontroller will convert the analog signals from the sensor to digital form and compare the signal values with the predefined values by the user, for the respective sensors. If the signal values from the sensor are exceeding thepredefined database values, the controller will take respective actions on the present situation to control the environment in the given area. It will monitor and control the environment by activating the respective output devices. The above complete process is performed automatically once the system is made ON.
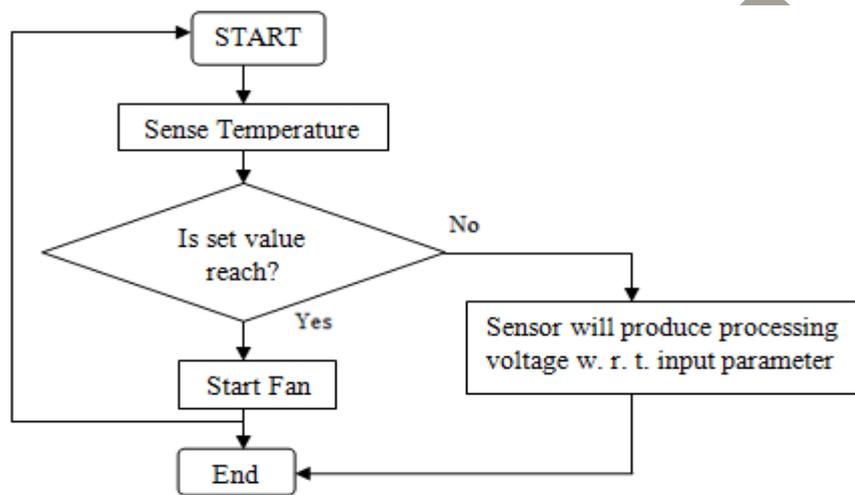
Fig. 4.Flowchart of Temperature sensor

Temperature is one of important factor to be checked for proper monitoring and controlling of corresponding plant. In this system, we had tested the performance of temperature sensor via LM35. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the temperature. Temperature sensor operates in 5V supply. It has linear 10.0 mV/°C scale factor. If the temperature rises to 31°C, system will switch on the fan. Fig. 4 shows a typical flowchart for temperature sensor.
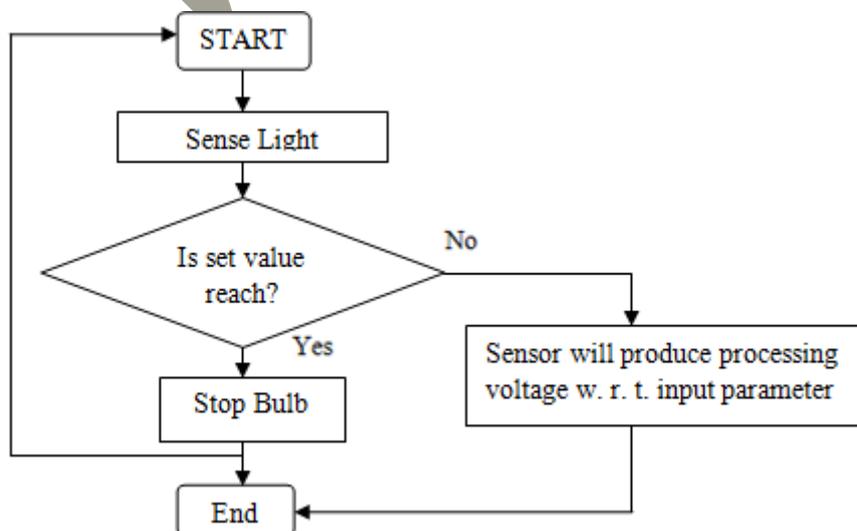
Fig. 5.Flowchart for LDR

An LDR is made of semiconductor material Cadmium Sulphide (CdS). The light falling on the brown zigzag lines on the sensor causes the resistance of the device to fall. This is known as a negative co-efficient. Since LDR is extremely sensitive in visible light range, it is well suited for the proposed application.In this system, when the Light rises to 70 lux, system will switch off bulb in the proposed system.


Fig. 6.Complete System

The above figure shows complete system. In this proposed system sensors data display on LCD at transmitter section. Sensors continuously monitor the conditions of environment present in the given area and give its responses to controller and this controller sends the information to computer. Receiver section will receive the data through zigbee network and post the data over the web page. This proposed system used in various industries, hotels and wherever the automated systems are required.

RESULT

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness.To design a reconfigurable smart sensor interface device that integrates data collection, data processing, andwireless transmission together. The device can be widely used in many application areas using IoT to collect various kinds of sensor data in real time.Here the values of sensors is measured by this critical situation can be avoided. It can also monitor the sensors through internet.

Fig. 7.LCD display
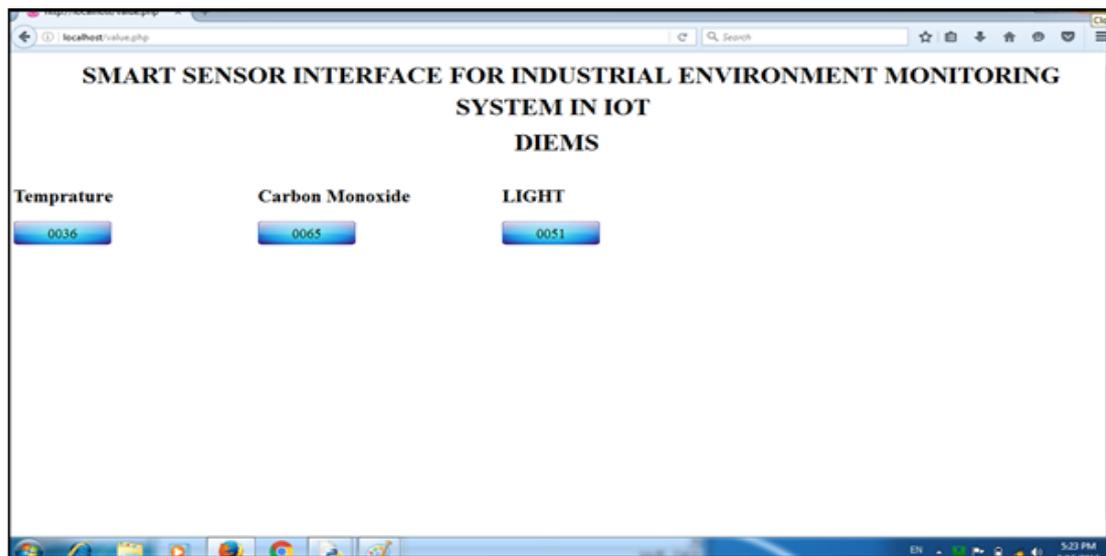
Fig. 8.Data display on web page

The screenshots of the developed system has been presented in above figure. In which it can monitor environment through output value of three sensors. In this system temperature shows in degree Celsius, gas shows in ppm and light shows in lux.

CONCLUSION

The proposed system is aimed to design a smart sensor system through which it can monitor equipment's in the industry without any manual operation. The system is developed through wireless communication through zigbee technology. The development of system involves the interfacing of three sensors to microcontroller. If any problem is detected it send the signal, there by the corresponding signal passes to the controller. The controller is an intelligent device which on or off devices as per set value of parameter. Likewise, this process repeats every time, to monitor the area without human involvement. LCD is provided to display the status of the parameters at transmitter section.

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