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Automated Monitoring of Industrial Loads Using Iot and Control Using Wireless Technology

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Abstract: Smart application has become more and more popular in recent years. It aims at helping people manage the various devices freely and build an autonomous environment. This project introduces a wireless solution based on Internet protocol to manage the industrial units easily. Based on this approach, we design a smart industry system with the implementation of related software and hardware. With the development of internet, the concept of IOT has become more and more popular. Devices are connected to the internet and stretch their reach. Since devices can become smart, the industry or the work area can be a smart area with easy automation monitoring. Smart application system can connect the various units together and provide a unified interface for users to interact with the monitoring block. Some main features are listed such as light control, remote control, smart energy, remote care, security and safety. As with the development of the Internet, Internet based remote monitoring solutions for industry has been proposed.

Key words: Internet of things (IOT) · Wireless sensor networks (WSN) · Universal Synchronous/ Asynchronous Receiver/Transmitter (USART)

INTRODUCTION

The Automation or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships [1], aircraft and other applications with minimal or reduced human intervention. Some processes have been completely automated. The biggest benefit of automation is that it saves labour; however, it is also used to save energy and materials and to Improve quality, accuracy and precision. The termautomaton, inspired by the earlier word automatic (coming from automation), was not widely used before 1947.Industrial automation deals primarily with the automation of manufacturing, quality control and material handling processes. General purpose controllers include Programmable logic controllers, stand-alone I/O modules and computers. Industrial automation is to replace the decision making of humans and manual command-response activities with the use of mechanized equipment and logical programming commands. Industrial automation is simply done at the industrial [2] level. Energy efficiency in industrial processes has become a higher priority. The internet of things is the network of physical objects- devices, vehicles, buildings and other items-embedded with electronics, software, sensors, network connectivity that enables these objects to collect and exchange data. The internet of things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based system and resulting in improved efficiency, accuracy and economic benefit; then internet of things is augmented with sensors and actuators, the technology becomes an instance of more general class of cyber physical system, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.

This paper presents the system layout of the work. Section II explains about the existing system design. Section III explainsin detail about the proposed system[3]. Section IV deals about hardware description. Section V about software description. Section VI deals about the obtained result.

Existing System: In existing, (add content) the devices are controlled manually with man power. Suppose there is wastage of energy in the form of running devices in the industry, it results in huge loss of power and thereby

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contributing to the economical fall. Mainly, the automatic detection of cautious environment in the industry is quite less in the existing system. Some of the disadvantages of existing systems are Power wastages are more, Man power is needed, Tendency for accidents to occur.

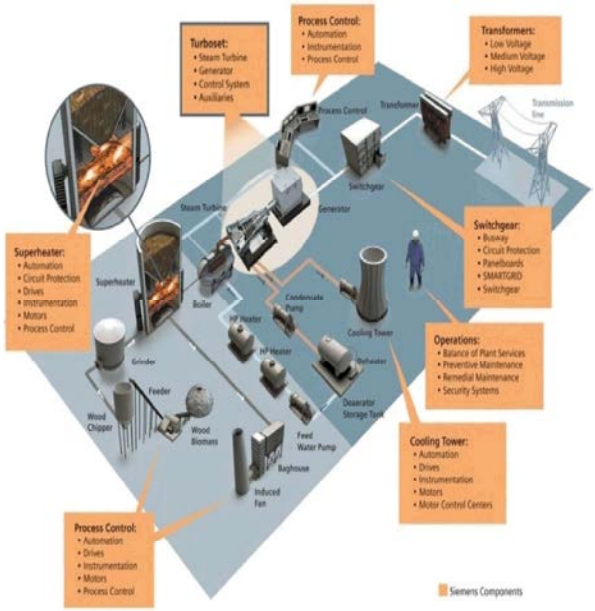

Fig. 1: Existing system

The main disadvantage in the existing system is the man power accidental conditions through which various load losses are evolved. The regular switching characteristics of the loads are further mishandled due to human error.

Proposed System: In the proposed system, industrial devices are be controlled by WSN (WIRELESS SENSOR NETWROKS). Here we monitor and control the fan, light and conveyor motor by wireless technology. TEMPERATURE sensor is placed for monitoring the effect of surrounding temperature. If the temperature increases more than the specified range, controller ATMEGA328 will automatically turn on the exhaust fan. Through the webpage we can monitor the industrial devices in mobile phones and computer systems. Microcontroller will control all the devices and send the data through WSN. Some of the advantage of proposed systems are Power wastages are reduced man power is limited, Efficient monitoring and control from a fixed position, Increased safety, Less human error.The working of the industrial automation is basically the system monitor and control using internet and wireless sensor networks from a remote area of work space. The main application of a temperature sensor helps in detecting the cautious range of temperature in an industry and automatically switches the exhaust fan for the prevention of extreme losses. The relay circuit system is given with sufficient supply with which the various other loads of both AC and DC sources can be controlled. The main application of the IOT system is the monitoring module through which the load status is automatically updated at a regular time frame. The interfacing between the Arduino and the WSN hardware as a RF system develops the overall central system of monitor and control.

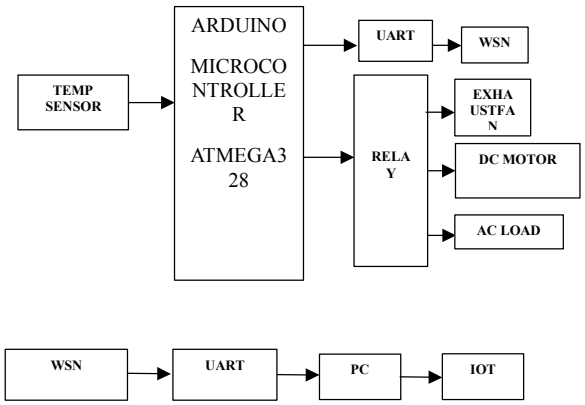

Fig. 2: Block diagram of proposed system

Working: Initially 240v single phase supply is given to step down transformer, were it transforms 240v into 12v. The 12v is given to Arduino microcontroller to be turned ON. Initially the program is loaded into the Arduino microcontroller using the USB port from the computer. A temperature sensor is connected to the A0 pin to get the analog input. According to the temperature value, the exhaust fan is turn ON and OFF. Then digital pin (output) is connected to the relay circuit in which four loads are connected. The WSN Transmitter/Receiver connected to the PC or laptop controls the Arduino which in turn controls the relay circuit in switching operation of the various loads.

Fig. 3: Proposed prototype

Hardware Description

Transmitter Modules: USB-RS232 converter cable provides a USB to RS232 serial interface with customised end connectors. Entire USB protocol handled by the electronics in the cable USB. EIA/TIA-232 and V.28/V.24 communication interface with low power requirements. UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space / no parity. Internal EEPROM with user writeable area. FTDI's royalty-free VCP allow for communication as a standard emulated COM port and D2XX 'direct' drivers provide DLL application programming interface. Visual indication of Tx and Rx traffic via LEDs in the transparent USB connector.

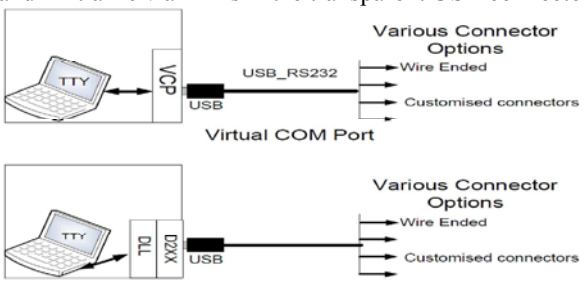

Fig. 4: USB to RS232 Converter

Receiver Module: The receiver module is connected to the arduino.The control from the PC or laptop is transmitted and it is received by module. With respect to the signal controlling of the system is done

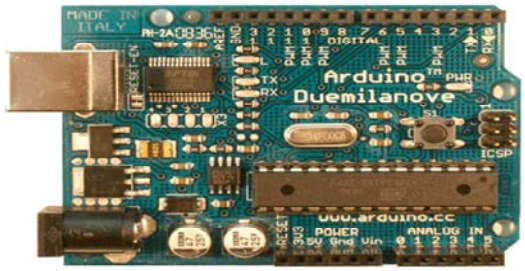

Fig. 5: Receiver Module

Power Supply: AC supply is given to the transformer and is stepped down. The stepped down voltage is rectified and filtered using a capacitor. A 12V supply from the step down transformer is given to the Arduino.

Relay Circuit: A relay circuit is similar to a switching component to which the various AC and DC loads. The supply for the relay circuit is obtained from the stepped down voltage of 12V. The relay circuit is generally in the Normally Open position and by the energizing capacity from the 12V source, the relay operates and closes the circuit for switching ON the loads connected.

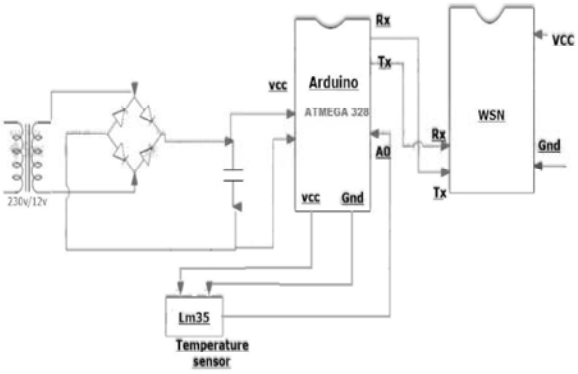

Fig. 6: Power supply

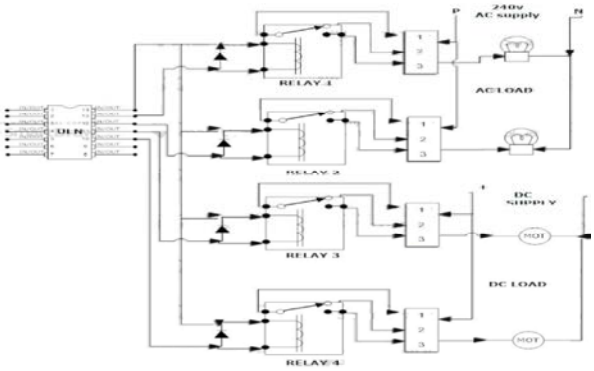

Fig. 7: Relay circuit

Software Description

Embedded C: Embedded C is a set of language extensions for the C Programmig language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks and basic I/O operations.

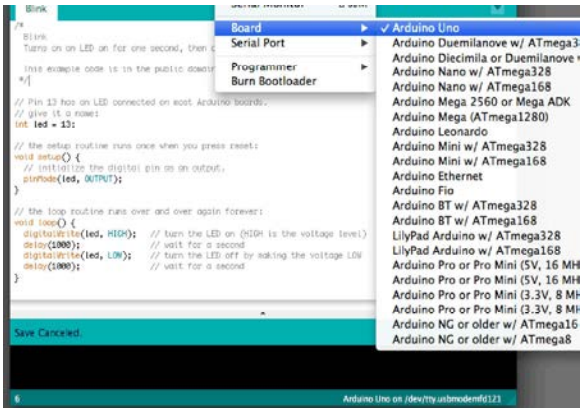

Fig. 8: Installation Of Adruino Ide

In this we use embedded c to program the arduino micro controller. The programming in arduino is very simple compare to micro controller and microprocessor.It is very simple and understandable by everyone. In our project the program is used to control the relay circuit and get input analog signal from temperature sensor.

Visual Basic: Like the BASIC programming language, Visual Basic was designed to accommodate a steep learning curve. Programmers can create both simple and complex GUI applications. Programming in VB is a combination of visually arranging components or controls on a form, specifying attributes and actions for those components and writing additional lines of code for more functionality. Since VB defines default attributes and actions for the components, a programmer can develop a simple program without writing much code. Programs built with earlier versions suffered performance problems, but faster computers and native code compilation has made this less of an issue. In the proposed work input to the arduino is given from visual basic. The controller is created in VB. When the respective input is given from VB, then corresponding load is turned on and off. In visual basic, we provide navigation commend to transmit the signal to the Internet.

Result: The control module as given below shows the various ON and OFF switches for the loads to be controlled. The module also displays the temperature value measured by the temperature sensor. The module also shows the specific graphical representation from which the variation of each controlled load is analysed.

Fig. 9: Graph

The webpage is the remote monitoring screen through which the various load conditions are monitored using a link or an IP address. The webpage also shows the switching conditions of each individual loads along with the logtime frame structure.

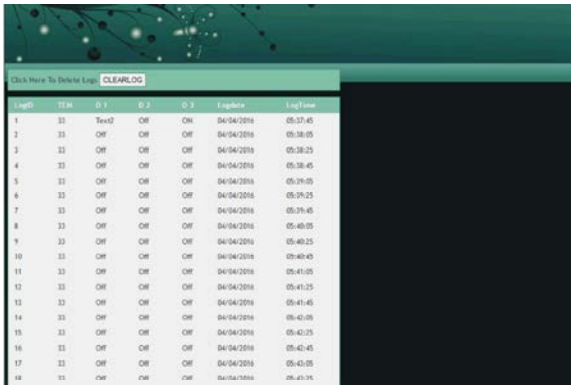

Fig. 10: Web page

CONCLUSION

Today extensive automation is practiced in practically every type of manufacturing and assembly process. Some of the larger processes include electrical power generation, oil refining, chemicals, steel mills, plastics, cement plants, fertilizer plants, pulp and paper mills, automobile and truck assembly, aircraft production, glass manufacturing, natural gas separation plants, food and beverage processing, canning and bottling and manufacture of various kinds of parts. Automation are especially useful in hazardous applications like automobile spray painting. automated systems are also used to assemble electronic circuit boards. Automotive welding is done with robots and automatic welders are used in applications like pipelines.

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