Smart Industrial Applications to Control Room Environment using Android Phone

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Abstract: This paper provides a low cost-effective and flexible Industrial control and monitoring system with the aid of an integrated micro-web server with IP connectivity for access to and control of equipment and devices remotely using Android-based smart phone app. The proposed system does not require a dedicated server PC with respect to similar systems and offers a new communication protocol for monitoring and controlling the Industrial environment with more than just switching functionality. Smart Industrial interfaces and device definitions to ensure interoperability between ARM based controller devices from various manufacturers of electrical equipment, meters and Smart Energy enables products to allow manufactured. We introduced the proposed Industrial energy control systems design intelligent services for user's and provides, we show their implementation, with smart phone.

Keywords: ARM based controller, Industrial Automation, Android, and Smartphone.

1. INTRODUCTION

Intelligent management of the power system, facilitate the joint use the current and minimizes power loss during transmission and power consumption is highlighted by the global community, academic institutions, and State administration. To gain full utility and customer protection dimensions, the idea of a smart grid enabling technologies used in recent years, attracting a great deal of attention in the energy industry and academia Such studies. With continued growth in popularity and functionality of mobile devices, demand advanced mobile applications widespread human life continue to grow. The use of Web Services is an open and interoperable method for providing remote access service or applications can communicate with each other. An attractive market for Industrial .Automation and network of busy families and individuals will is physical Limitations. IBOARD is Ethernet Shield, and it was the smart

Industrial micro web server. Arduino open source electronics prototyping platform based on Flexible, easy-to-use hardware and software. The Arduino IBOARD Microcontroller Board of Based on the IBOARD with 54digital input output pins. The Ethernet interface is Arduino via the SPI pins. Low-voltage switching relays were used to integrate Devices with Arduino is to show switching functionality. The LM35 temperature Sensor is used to control a smart Industrial environment. A supervisory control system Intranet, low cost and high-performance can react The ZigBee technology. An end node, the node sends data to the coordinator, and the coordinator Hub sends the data back to the terminal end of the loop. Since all devices have their own IP Address based on IPv6, they can be directly connected to an external network. So, all smart devices It can not only through thehandheld remote control device to the central and local Industrial , but can also be controlled remote computer controlthrough the introduction of Industrial Internet Gateway machine.

2. RELATED WORK

Existing method

In recent years there is a vast technology improvement in industrial control rooms for monitoring the entire field of Industrial plants. High end PLC's are being implemented for controlling the entire process of fields. But a problem is that even though automation takes the complete control of total plants few authentication and manual actions are needed from user side for completing the control action. Hence there is a must situation for users presence at all times in the control room for taking some timely needed control actions. Due to the static nature of control room environment, the user should always be static to monitor the process. The proposed system approach provides a good solution to this problem. The whole control room environment is additionally implemented in the Arduino-android platform and the same is communicated to the process through Wi-Fi / Bluetooth. Now the user in control room can be mobile at anytime, anywhere to monitor and control the whole plant. An Arduino-Uno board is used here for acquiring process control parameters from the sensors and transmitting it via a Bluetooth module to an android device. Hence the parameter values can be monitored and stored simultaneously.

Proposed system

The current system is developed based on the sensor acquisition methods. As discussed in the existing system the data can only be monitored but cannot possible to control the system. Here we are proposing a system

which can monitor the "lightning level in lumens" and "temperature in degrees" and display the same on to the android app through Bluetooth communication. Also we can here by operate the system using controlling buttons provided on the dashboard of the android application. Where to get the accuracy in the monitoring values, here we are using 32-bit ARM based controller to make high effective system where as in the provided used 8bit AVR controller.
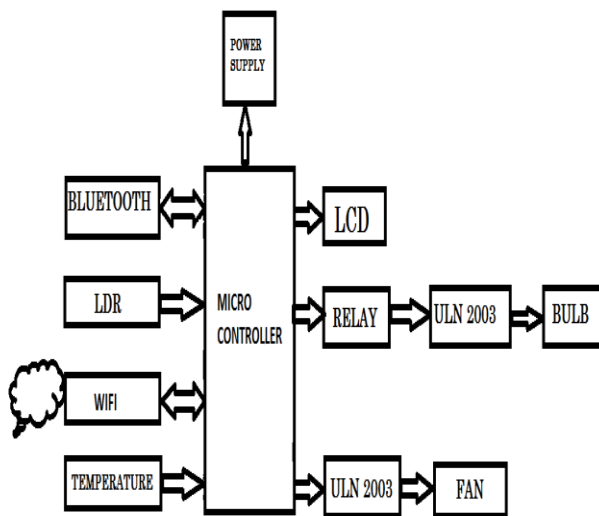

Fig:-1 Block diagram

3. IMPLEMENTATION

LPC2148 Microcontroller

The LPC2148 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2148 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTs, SPI, SSP to I2Cs, and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems.

Power Supply Unit

The input to the circuit is applied from the regulated power supply. The ac. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating dc voltage. So in

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order to get a pure dc voltage, the output voltage from the rectifier is fed to a filter to remove any ac components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage. The block diagram of regulated power supply is shown in the figure 2.4
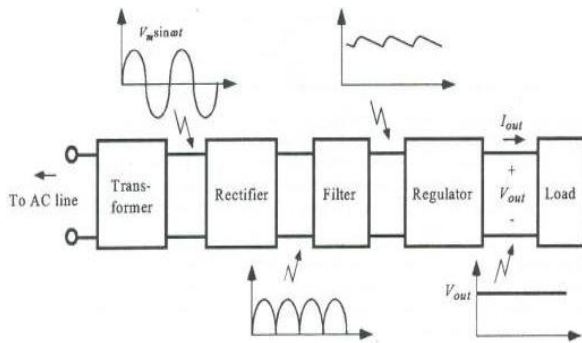

Fig:-2 Components of power supply

Bluetooth

Bluetooth is a wireless technology used to transfer data between different electronic devices. The distance of data transmission is small in comparison to other modes of wireless communication. This technology eradicates the use of cords, cables, adapters and permits the electronic devices to communicate wirelessly among each other.

Liquid Crystal Display

LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the declining prices of LCDs.The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.

Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.Ease of programming for characters and graphics.

A Light Dependent Resistor

(LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol.

GSM Global System for Mobile Communications, originally GroupeSpécialMobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones, first deployed in Finland in July 1991. As of 2014 it has become the de facto global standard for mobile communications - with over 90% market share, operating in over 219 countries and territories. 2G networks

developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).Subsequently, the 3GPP developed third-generation (3G) UMTS standards followed by fourth-generation (4G) LTE Advanced standards, which do not form part of the ETSI GSM standard.

Temperature sensor - the lm35

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in oC). The LM35 - An Integrated Circuit Temperature Sensor Use of LM35s to Measure Temperature You can measure temperature more accurately than a using a thermostat. 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.

Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

ULN 2003

The ULN2003A is an array of seven NPN Darlington transistors capable of 500mA, 50V output. It features common-cathode fly back diodes for switching inductive loads. It can come in PDIP, SOIC, SOP or TSSOP packaging. In the same family are ULN2002A, ULN2004A, as well as ULQ2003A and ULQ2004A, designed for different logic input levels.

4. EXPERIMENTAL RESULTS

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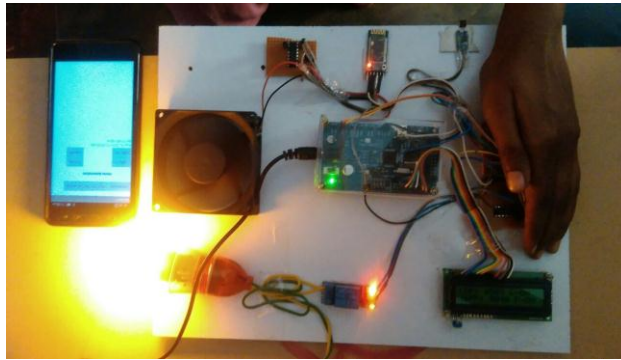Fig:-3 Project Kit Main Body

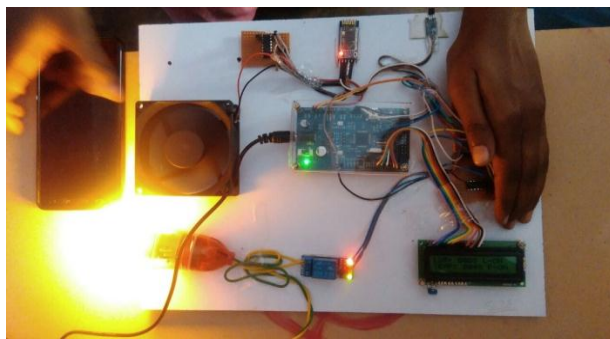Fig:-4 Project Kit Working Face

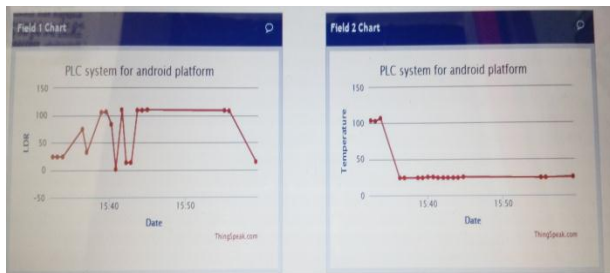Fig:-4 Controlling with Android Smartphone.

Fig:-5 PLC Results on Graph

5. CONCLUSION

In this paper we propose a new architecture for the monitoring and control system that uses a flexible Industrial based Android Smartphone at a reasonable price and implemented by XBee wireless transceiver and IBOARD Arduinos well as using android app for system control configuration. The proposed architecture is used in a quiet based web services in an interoperable application layer for communication between the remote user and the Industrial device. All Android-based Smartphone, the Wi-Fi connection is the support built, the Industrial access device to control. If the Internet is not possible, it can be access bused the 3G mobile system mobile. Future studies will use the commands for controlling the voice applications by implementing the Industrial server.

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