Analog and Digital Data Logger for Home Appliances

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Abstract:

This paper proposed a portable wireless data acquisition system for temperature & voltage in real time process dynamics. Process variables (like temperature, pressure, flow, level, voltage) vary with time in certain applications and this variation should be recorded so that a control action can take place at a defined set point. This paper proposes an Arduino embedded platform for a sensor having a network interface using the Wi-Fi protocol, which is specially designed for the sensors network. The Wi-Fi protocol is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensors network. This wireless data logger senses and monitors the variations in the local temperature thereby transmits the data within the range to an assigned embedded processor based server. Received temperature, voltage is displayed on simultaneously on a telnet app.

INTRODUCTION

The most important part of any type of industry is safety. In the mining industry safety and security is a first aspect of all. To avoid any types of unwanted conditions, every mining industry follows some basic precaution. Communication is the most vital key factor today, to monitor different parameters such as temperature, increasing humidity level, and carbon monoxide gas continuously using sensors such as LM35, gas sensor MQ2 and humidity sensor to take necessary actions accordingly to avoid any types of hA zardous conditions and gives an alert using buzzer. To achieve safety in underground mines, a suitable communication system must be created between workers, moving in the mine, and a fixed base station. The wired communication network technology system will be not so effective. Under the mines due to uncomfortable situation the installation cost as well as maintenance cost is high for wired communication networks. For the successfully wireless data transmission, in this work a low cost Wi-Fi is utilized in routers. A cost effective based wireless mine supervising system with early-warning security system on carbon monoxide, temperature, humidity in mining area is proposed.

INTRODUCTIONOF EMBEDDESYSTEM

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. A good example is the microwave oven. Almost every household has one, and tens of millions of them are used every day, but very few people realize that a processor and software are involved in the preparation of their lunch or dinner.

This is in direct contrast to the personal computer in the family room. It too is comprised of computer hardware and software and mechanical components (disk drives, for example). However, a personal computer is not designed to perform a specific function rather; it is able to do many different things. Many people use the term general-purpose computer to make this distinction clear. As shipped, a general-purpose computer is a blank slate; the manufacturer does not know what the customer will do wish it. One customer may use it for a network file server another may use it exclusively for playing games, and a third may use it to write the next great American novel.

Frequently, an embedded system is a component within some larger system. For example, modern cars and trucks contain many embedded systems. One embedded system controls the anti-lock brakes, other monitors and controls the vehicle's emissions, and a third displays information on the dashboard. In some cases, these embedded systems are connected by some sort of a communication network, but that is certainly not a requirement.

Microcontroller
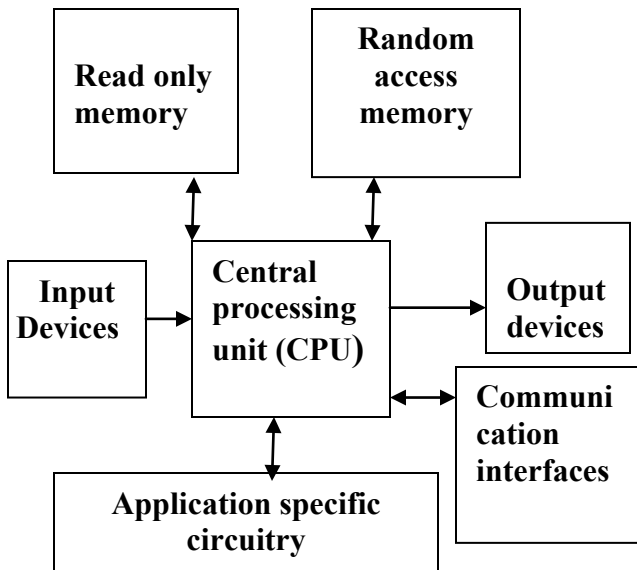
Microcontrollers as the name suggests are small controllers. They are like single chip computers that are often embedded into other systems to function as processing/controlling unit. For example the remote control you are using probably has microcontrollers inside that do decoding and other controlling functions. They are also used in automobiles, washing machines, microwave ovens, toys ... etc, where automation is needed.

Micro-controllers are useful to the extent that they communicate with other devices, such as sensors, motors, switches, keypads, displays, memory and even other micro-controllers. Many interface methods have been developed over the years to solve the complex problem of balancing circuit design criteria such as features, cost, size, weight, power consumption, reliability, availability, manufacturability. Many microcontroller designs typically mix multiple interfacing methods. In a very simplistic form, a micro-controller system can be viewed as a system that reads from (monitors) inputs, performs processing and writes to (controls) outputs.

Now, let us see the details of the various building blocks of the hardware of an embedded system. As shown in Fig 2.2 the building blocks are:

- Central Processing Unit (CPU)
- Memory (Read-only Memory and Random Access Memory)
- Input Devices
- Output devices
- Communication interfaces
- Application-specific circuitry

DESIGN APPROACH

In this chapter we discuss about the block diagram **ANALOG AND DIGITAL DATA LOGGER FOR HOME APPLIANCES**
A building blocks of an embedded system
Working of the project:

As shown in above block diagram, helmet unit consist of microcontroller (atmega328p), Wi-Fi communication module, temperature sensor (LM35), voltage, ldr sensor, power supply (adaptor 12v). Three sensors (temperature, voltage, ldr) which are connected to microcontroller AT328P .These three sensors are connected to the adc ports of microcontroller to convert the analog values into digital form. The sensors available in the helmet collect the temperature, voltage and ldr information and send this information to the remote monitoring unit. Low rate Wi-Fi is used for wireless data transmission. When the control center detects the parameters are sends remote control area which is telnet through IP address. A temperature sensor (LM35) shows the present temperature every 1 sec values in telnet. Similarly remaining sensors sense respective values and post controlling area telnet trough IP address and Port number .

HARDWARE TOOLS
In this project the hardware requirements are following:

- Arduino UNO microcontroller
- Temperature Sensor
- Ldr sensor
- Voltage sensor
- adaptor
- Wi-Fi module(ESP8266)
- RTC

HARD WARE

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available. The source code for the IDE is released under the GNU General Public License, version 2.[8] Nevertheless, an official Bill of Materials of Arduino boards has never been released by Arduino staff.
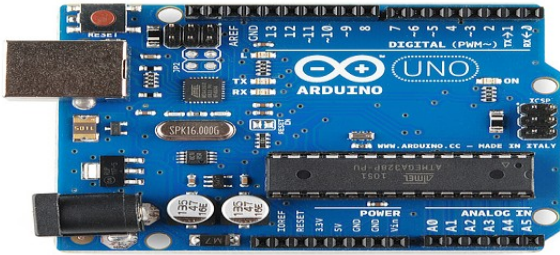
Relay

A relay is used to isolate one electrical circuit from another. It allows a low current control circuit to make or break an electrically isolated high current circuit path. The basic relay consists of a coil and a set of contacts. The most common relay coil is a length of magnet wire wrapped around a metal core. When voltage is applied to the coil, current passes through the wire and creates a magnetic field. This magnetic field pulls the contacts together and holds them there until the current flow in the coil has stopped. The diagram below shows the parts of a simple relay.
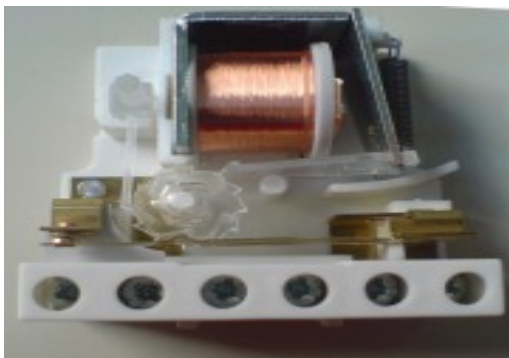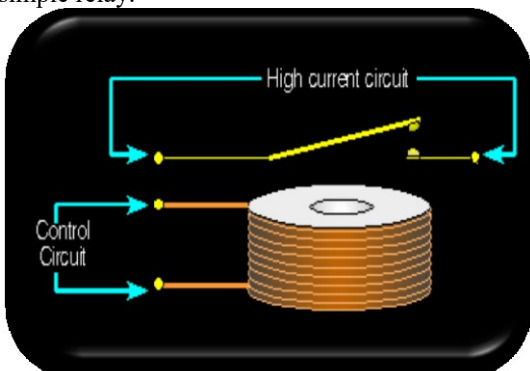
Latching relay

Solid-state relay

A solid state relay (SSR) is a solid state electronic component that provides a similar function to an electromechanical relay but does not have any moving components, increasing long-term reliability. With early SSR's, the tradeoff came from the fact that every transistor has a small voltage drop across it. This voltage drop limited the amount of current a given SSR could handle. As transistors improved, higher current SSR's, able to handle 100 to 1,200 Amperes, have become commercially available. Compared to electromagnetic relays, they may be falsely triggered by transients.
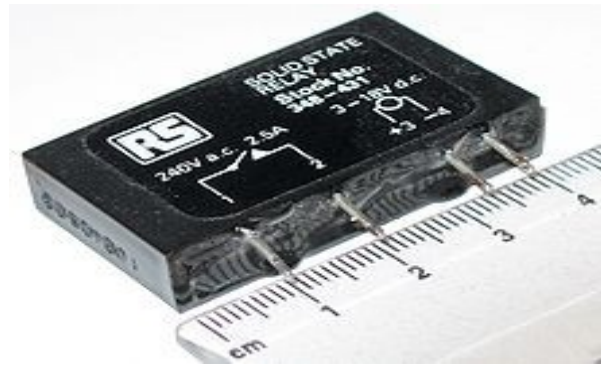

Real-time clock

A **real-timeclock** (**RTC**) is a computer clock (most often in the form of an integrated circuit) that keeps track of the current time.

Although the term often refers to the devices in personal computers, servers and embedded systems, RTCs are present in almost any electronic device which needs to keep accurate time.

WIF MODULE (ESP8266)
Description:

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.
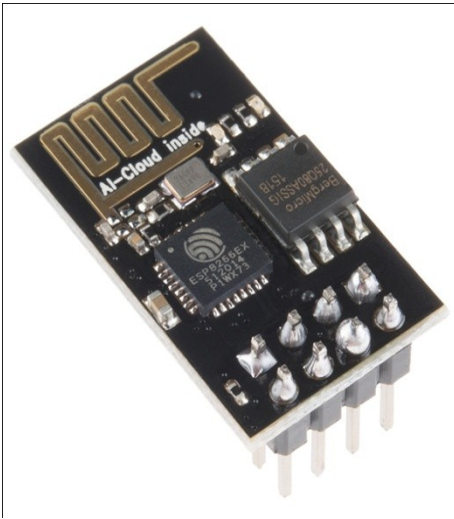
Hard Ware of ESP8266
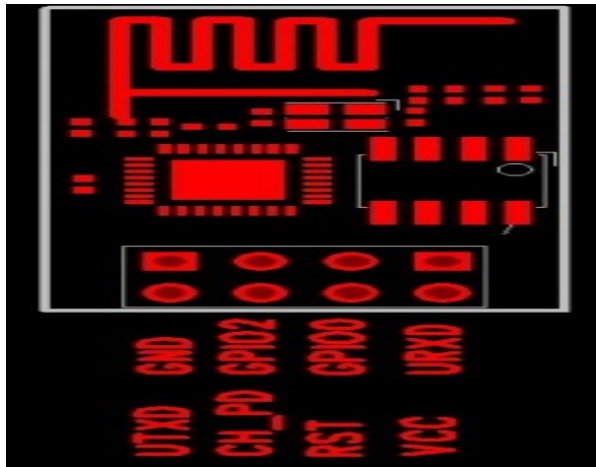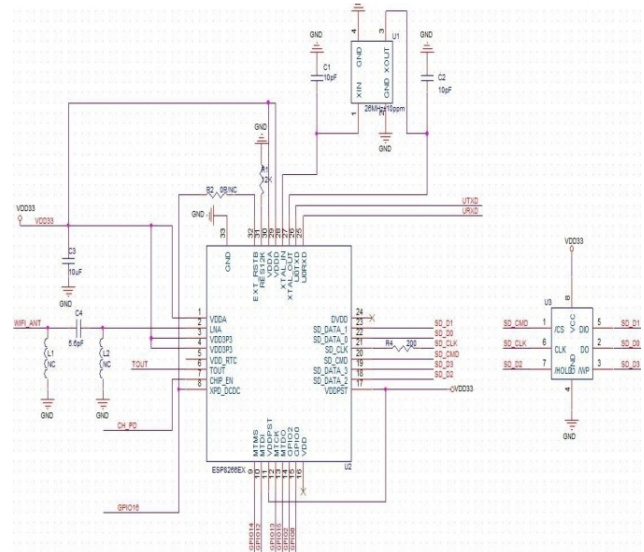
ESP8266 Schematic:

SOFTWARE REQUIREMENTS

The software's used for this project are:

Arduino IDE

Language :C /C++

CONCLUSION

As the system requirement and the required components can be easily made available this project can be implemented easily. It will provide security and it updates the sensors values trough telnet app and IP address the . It has been presented the original design of the low power WiFi wireless sensor system with an extremely reduced cost. It is reliable system with quick and easy installation. The system might be easily extended. It will improve system scalability and extend accurate in home applications and also industry applications By using RTC it updates the values of digital and analog values in telnet app trough wireless communication (WiFi).

Future Scope

The system also can be easily extended with WiFi wireless image transmission facility in future. It will improve scalability of underground environment and extend accurate position of miners. In future, with the help of WiFi module and GUI (software part), we can avoid railways accidents, road accidents, submarine accidents etc.

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