Wi-Fi Based Wireless Sensor Network

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Abstract:

The project aims at designing a WIFI based wireless sensor network . The devices can be switched ON/OFF using Wi-Fi in android phone and also the live temperature, water level and are displayed on the screen of android phone. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in agricultural which produces sparks and also results in fire accidents in few situations. In this considering the advantages of Wi-Fi an advanced automation system was developed to control the appliances in the agricultural environment. Wi-Fi (Short for Wireless Fidelity) is a wireless technology that uses radio frequency to transmit data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps. Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet.

Keywords:

ARM-7,Wi-Fi module, Sensors, Android Phone.

I.Introduction:

The age of the Internet of things comes; wireless sensor networks become the core of networking. In order to achieve greater things on the technical requirements of the Internet of things, we adopt the technology of wireless sensor network based on Zigbee, GPRS and Web Services technology designing a set of low cost, low power. This project is mainly used to monitoring the temperature, water level, Gas Sensor. By using the temperature sensor we can monitor the temperature, by using the GAS sensor we can monitor the GAS.

The controlling device for the automation in the project is a Microcontroller. The data sent from Android phone over Wi-Fi will be received by Wi-Fi module connected to Microcontroller. Microcontroller reads the data and decides the switching action of electrical devices connected to it through Relay switches. Also, the live temperature, Gas, water level, from the system is continuously sent to android phone and can be monitored on android phone screen. The Microcontroller is programmed used embedded 'C' language.

II.The System Architecture:

In this the block diagram of the project and design aspect of independent modules are considered. Block diagram is shown in fig:

Wi-Fi based Smart wireless sensor network
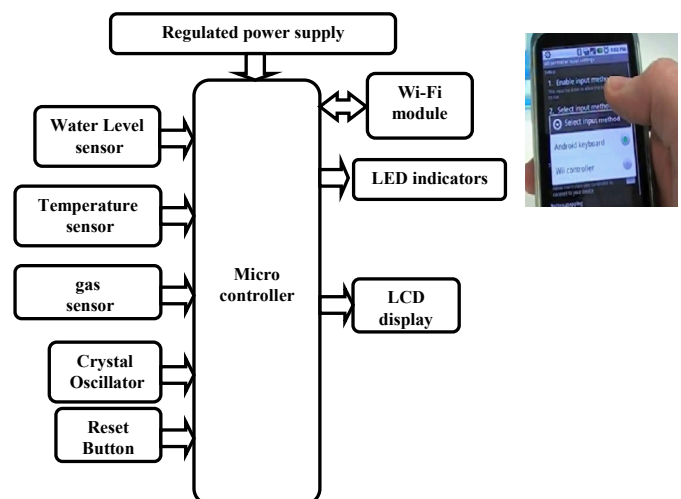
The system consists of wireless sensor networks and wi-fi module. The whole system designs good human-machine interface, easy exchange.

III. Design of wireless sensor network
A.Wireless sensor network hardware design:

Considering the wireless sensor network requirement to implement low cost, low power consumption, high performance and high sensitivity and the anti interference ability. In this paper, we choose LPC 2148 chip , LM 324, LM 35, MQ-6 for sensors.

1)LPC 2148:

ARM Intelligent Monitoring Center uses LPC 2148 processor as its main controller.It uses16-bit/32-bit ARM7T-DMI-S microcontroller in a tiny LQFP64 package. 8 KB to 40 KB of on-chip static RAM and 32 KB to 512 KB of on-chip flash memory. 128-bit wide interface/accelerator enables high-speed 60 MHz operation. In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader Software. Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1ms. USB 2.0 Full-speed complaint device controller with 2 KB of endpoint RAM. In addition, the LPC2146/48 provides 8 KB of on-chip RAM accessible to USB by DMA. One or two (LPC2141/42 vs. LPC2144/46/48) 10-bit ADCs provide a total of 6/14 analog inputs, with conversion times as low as 2.44 µs per channel. Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only).

2)Water level sensor:

The LM324 series consists of four independent, high gains; internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits which now can be more easily implemented in single power supply systems. For example, the LM124 series can be directly operated off of the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies.

3)Temperature sensor:

The LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.To detect the heat produced during fire occurrence we use temperature sensor.
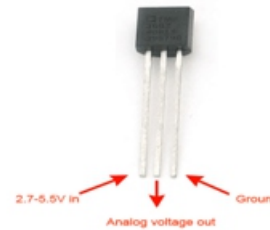
The Temperature Sensor LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

Description:

Temperature is the most-measured process variable in industrial automation. Most commonly, a temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in industrials applications.A large distinction can be made between temperature sensor types. Sensors differ a lot in properties such as contact-way, temperature range, calibrating method and sensing element. The temperature sensors contain a sensing element enclosed in housings of plastic or metal. With the help of conditioning circuits, the sensor will reflect the change of environmental temperature.

4)Gas sensor:

The MQ6 is a simple-to-use liquefied petroleum gas (LPG) sensor. It can be used in gas leakage detecting equipment in consumer and industry applications, this sensor is suitable for detecting LPG, iso-butane, propane, LNG. Avoid the noise of alcohol, cooking fumes and cigarette smoke. The sensitivity can be adjusted by the potentiometer.

LPG Gas sensor MQ06:

This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

B.Wi-Fi communication protocol:

Wi-Fi is a mechanism for wirelessly connecting electronic devices. A device enabled with Wi-Fi, such as a personal computer, video game console, smart phone, or digital audio player, can connect to the Internet via a wireless network access point. An access point (or hotspot) has a range of about 20 meters (65 ft) indoors and a greater range outdoors. Multiple overlapping access points can cover large areas.A Wi-Fi enabled device such as a PC, video game console, mobile phone, MP3 player or PDA can connect to the Internet when within range of a wireless network connected to the Internet. The coverage of one or more interconnected access points called a hotspot can comprise an area as small as a single room with wireless-opaque walls or as large as many square miles covered by overlapping access points. "Wi-Fi" is a trademark of the Wi-Fi Alliance and the brand name for products using the IEEE 802.11 family of standards. Wi-Fi is used by over 700 million people. There are over four million hotspots (places with Wi-Fi Internet connectivity) around the world, and about 800 million new Wi-Fi devices are sold every year. Wi-Fi products that complete Wi-Fi Alliance interoperability certification testing successfully may use the "Wi-Fi CERTIFIED" designation and trademark.

IV. Analysis and implementation:

In this the, schematic diagram and interfacing of ARM LPC-2148 microcontroller with each module is considered.
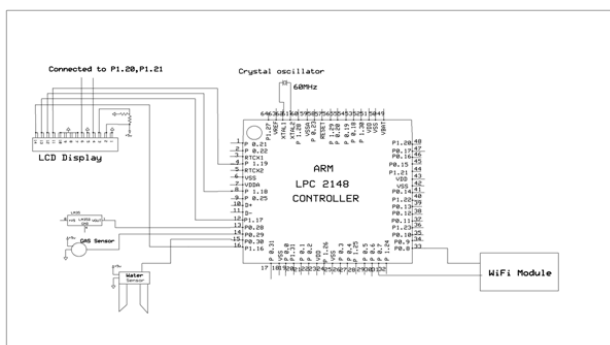

The above schematic diagram of Wi-Fi based Smart wireless sensor network explains the interfacing section of each component with micro controller and input output modules.The project aims at designing a Wi-Fi based wireless sensor network. This system can be used to monitor the live temperature, water level, gas detection these all values will displays on LCD and also displayed on the android phone. Here Wi-Fi wireless technology is used for sending these values into android mobile phone. The controlling device for the automation in the project is a Microcontroller. The data sent from Android phone over Wi-Fi will be received by Wi-Fi module connected to Microcontroller. Microcontroller reads the sensors i.e live temperature, Gas, water level, from the system is continuously sent to android phone and can be monitored on android phone screen and also displays on LCD. The Microcontroller is programmed used embedded 'C' language.

V. Conclusion:

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

VI. References:

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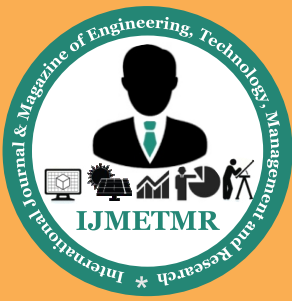
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