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Wi-Fi Based Reconfigurable Smart Sensor Interface for Industrial Monitoring System in IOT

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Abstract:

Internet of things (IoT) is rapidly increasing technology. IoT is the network of physical object or things embedded with electronics, software, objects to collect and exchange data. In this paper we are developing a system which will automatically monitor the industrial applications and generate alerts or take intelligent decisions using concept of IoT has given us a promising way to build powerful industrial systems and applications by using wireless devices, android and sensors. In main contribution of this review paper is that it summarises uses of IoT in industries with wi-fi technology to monitor and control the industry and uploading the data on web.

1. Introduction:

In recent years a wide range of industrial IoT applications have been developed and deployed. Evolution of this starts from RFID technology, which allows microchips to transmit the identification information to a reader through wireless communication. By using RFID readers, people can identify, track, and monitor any objects attached with RFID tags automatically. Another technology is the wireless sensor networks (WSNs), which mainly use interconnected intelligent sensors to sense and monitoring. Its applications include environmental monitoring, industrial monitoring, traffic monitoring. Both RFID and WSN are used to develop IoT. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. Provide a bridge between the real physical and virtual worlds. Allow the ability to observe the previously unobservable at a fine resolution over large spatiotemporal scales. Have a wide range of potential applications to industry, science, transportation, civil infrastructure, and security. The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting.Then upcoming technology is IoT with wi-fi technology. In previous years, Industry was monitored manually, but this paper introduces wi-fi technology to monitor as well as control the Industry autonomously without human intervention and uploading data on web.

2. Goals and objectives:

To monitor the sensor data using IOT Technique.
To collect the data without loss and response in real time environment and monitor the sensor data everywhere using IP address.

3. Existing system:

No ways to detect un-even condition in industry. Manual intervention required for monitoring. CCTV used which only monitor but no Alert generation. Alert and their appropriate actions not present manually.

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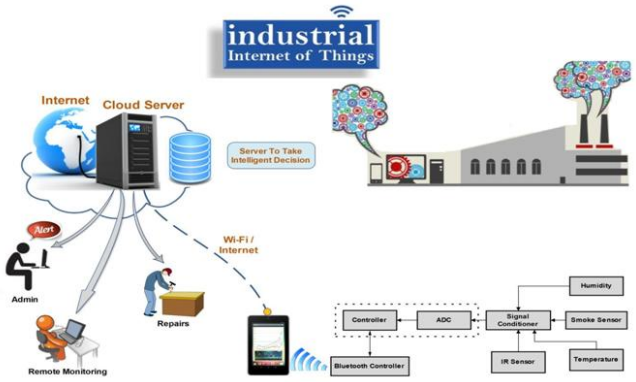
Time consuming approach to detect and generate Alert Manually and whenever we want data can be accessed from the web easily.

4. Overview of the system:

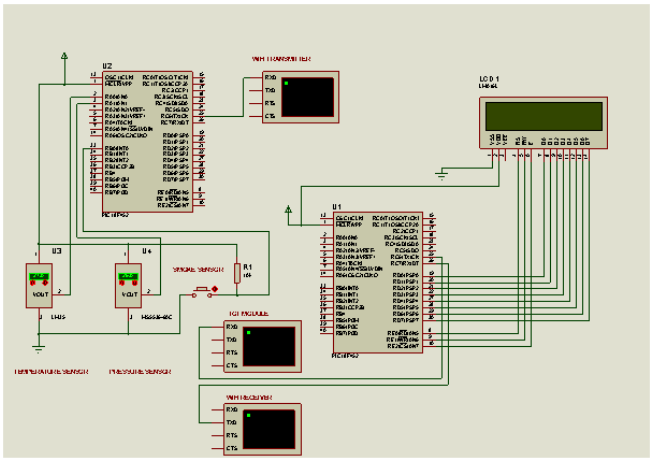
In this modern era of automation and advanced computing using IoT with Artificial Wi-Fi offer promising solutions towards the automation of Industry. In order to understand the development of IoT in industries, this paper reviews the current research of IoT, key enabling technologies, major IoT applications in industries, and identifies research trends and challenges. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure.The designed system is by using PIC micro controller which supports different features and algorithms for the development of industrial automation systems.

Using PIC controller we can connect all types of sensors and we can connect 8 bit micro-controller based sensor network to PIC controller using different wired or wireless technology. Many open source libraries and tools are available for wireless sensor network development and controlling. We can monitor and control the wireless sensor network remotely using Internet and web server.The system describes the development of a wireless industrial environment measuring temperature, humidity, atmospheric pressure, soil moisture; water level and light detection. Where the wireless connection is implemented to acquire data from the various sensors, in addition to allow set up difficulty to be as reduced. By using Wi-Fi technology we send the sensors data to authorized person.



Sensors (Temperature sensor, Pressure sensor, Humidity sensor, Vibration sensor, Intrusion sensor) are used to percept the environment and object conditions. Analog signal are provided to android device produced by sensors. Admin set threshold to every sensors placed in Industry. Android check this threshold against incoming analog signal. When it encounter an uneven condition devices are used to take accurate measures so the preventive measures can be Taken accordingly as well as data uploaded on the web so that whenever we want we can access that.

5. BLOCK DIAGRAM OF THE SYSTEM ON PROTEUS TOOL



6. Components details

6.1. Microcontroller

There are a wide variety of micro-controllers available to implement various tasks, among them the 8051 and PIC are the mostly used. The 8051 is probably the most popular 8-bit micro-controllers ever.

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Many different I/O features are integrated around the 8051 core to create a micro-controller which needs only very little extra hardware to do most of the jobs. The main disadvantage of the standard 8051 core is that there's only one 16 bit pointer register available. Moving a block of data is a very tedious job which takes far too much data moving overhead. It also does not have an internal Analog to Digital Converter (ADC). PIC16F877A is an 8-bit micro-controller which has 40 pin DIP and is based on Harvard Architecture. PIC stands for Peripheral Interface Controller and F for flash memory.

The PIC16F877A features 256 bytes of EEPROM data memory, self-programming, an LCD, 2 Comparators, 8 channels of 10-bit Analogue -to-Digital converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface for the 2-wire Inter-Integrated Circuit bus and a Universal Asynchronous Receiver Transmitter . All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications. So we have utilized the MICROCHIP PIC16F877A micro-controller in the project. Reason for Selecting PIC16F877A:

Rich in peripherals: The PIC micro-controller has many built in peripherals which can be utilized for various purposes. The 40 pins of PIC make it easier to use the peripherals as the functions are spread out over the pins. This makes it easier to decide what external devices to attach without worrying too much if there enough pins to do the job.

Re-programmable controller: The PIC16F877A has 8kb flash memory which can be used to erase and rewrite the programs for the controller. Hence the devices can be re-programmed up to 100,000 times.

Low power consumption: The controller works with a low power supply such as 5V DC.

Easy programming, cheap and reliable: It is easy to program the PIC micro-controller in embedded C language or assembly level language.

Inbuilt ADC: The single 10 bit Analogue to Digital Converter can have up to 8 inputs for a device multiplexed from input pins. The Port A is dedicated for this function. The ADC can be used during sleep but you have to use the RC clock mode. One benefit of this is that there will be no digital switching noise so you will get better conversion accuracy.

6.2. Temperature sensor:

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 µA from the supply, it has very low self-heating of less than 0.1°C in still air.

Features:

Calibrated Directly in Celsius (Centigrade)

Linear + 10-mV/°C Scale Factor

0.5°C Ensured Accuracy (at 25°C)

Rated for Full −55°C to 150°C Range

Suitable for Remote Applications

Low-Cost Due to Wafer-Level Trimming

Operates from 4 V to 30 V

Less than 60-µA Current Drain

Low Self-Heating, 0.08°C in Still Air

Non-Linearity Only ±1⁄4°C Typical

Low-Impedance Output, 0.1 Ω for 1-mA Load

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6.3. Pressure sensor

MS5536-60C is a family of high-resolution factory calibrated pressure sensors. The devices include a piezoresistive pressure sensor and an ADC-Interface IC. The 3-wire serial interface ensures simple communication with any micro-controller. The devices provide digital pressure and temperature information as 16-Bit data word each. In addition 64-Bit of individually calibrated compensation coefficients are stored allowing for a highly accurate software compensation of process spread and temperature effects.The devices have a very low standby current and automatically enter power down mode after each conversion. The optimum compromise of refresh rate and average current consumption can be defined by the application software.

Features are:

16 bit ADC resolution

Supply voltage 2.2v to 3.6v

Low supply current

No external components required

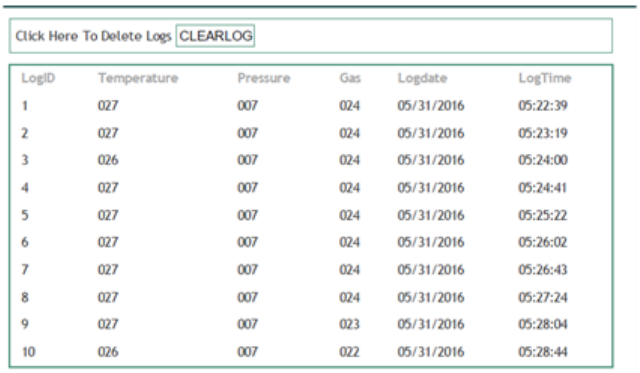
6.4. Smoke sensor

MQ-6 sensor is composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin4 of them are used to fetch signals, and other 2 are used for providing heating current. Resistance value of MQ-6 is difference to various kinds and various concentration gases. So, when usingthese components, sensitivity adjustment is very necessary.

Some features are:

High sensitivity to LPG, iso-butane, propane
Small sensitivity to alcohol, smoke.
Fast response
Stable and long life
Simple drive circuit

7. Results



Click Here To Delete Logs CLEARLOG

LogID	Temperature	Pressure	Gas	Logdate	LogTime
1	027	007	024	05/31/2016	05:22:39
2	027	007	024	05/31/2016	05:23:19
3	026	007	024	05/31/2016	05:24:00
4	027	007	024	05/31/2016	05:24:41
5	027	007	024	05/31/2016	05:25:22
6	027	007	024	05/31/2016	05:26:02
7	027	007	024	05/31/2016	05:26:43
8	027	007	024	05/31/2016	05:27:24
9	027	007	023	05/31/2016	05:28:04
10	026	007	022	05/31/2016	05:28:44

8. Applications

Industry and office: We can implement sensors in wide area over the machines and instruments. Control and Monitor circumstances by using concept of Wi-Fi technology and IoT.

Home: We can implement sensors to household appliances and monitor and control with the help of Wi-Fi technology.

Environment: we can implement sensors to monitor environmental changes with the help of Wi-Fi technology with IoT.

9. Conclusion:

Nowadays we need everything computerized. Earlier we can only monitor the situations with the help of cameras. In industries to reduce manual overhead we have implemented Internet of Things (IoT) in Industry to monitor as well as to inform the responsible person to take appropriate measures, but this will partially fulfil our requirement. As sometimes it will be late in this process and it will harm to property as well as life. For this purpose we are developing a system for Industrial monitoring using Wi-Fi with IoT to make system automated which will take intelligent decisions.

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