

Industrial Disaster Management using RF

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Abstract- This paper proposes a hazardous environment monitoring and control for monitoring information concerning safety and security, utilizing Wireless Sensor Network (WSN) technology a wire based system has also raises numerous problems: the difficulties in locating the particular area affected by the industrial parameter, the complexity in operation of the system. The control of the temperature of a room containing chemicals and toxic gases the existing research has failed to provide a flexible solution for controlling such conditions by connection oriented systems. Thus, Wireless Sensor Network (WSN) is an innovative technology for monitoring of wide area. Emphasizing the monitoring industrial gas concentration, the Wireless Sensor Network is designed, wherein the MQ-6 is employed to sense the industrial gas. Data acquisition is performed via the deployed wireless sensor network with focus on four main parameters: temperature, light, gas and humidity. The Wireless Sensor Network operates with good reliability and provides the data of the parameters at the base station in real time.

Keywords – Wireless Sensor Network; RF module SCADA, PIC 16F877 microcontroller; Process Monitoring and Control .

I. INTRODUCTION

The environmental care has become one of the biggest concerns for almost every country in the last few years. Even though the industrial accident level has been increasing without any control in the last decades, the current situation in the industry towards more hazardous environment. Recently, the modern industries are demanding sophisticated instrumentation for monitoring and control of environmental risk parameters of the hazardous area. Human safety and property losses are the essential to maintain the equilibrium between industry and environments. Five factors compose the basis factors of a risk accident: the fire, Smoke, gas leakage, radiation and high temperature source, environmental elements and combustible material.

A industrial accident usually occurs as the result of their combined effects.



Fig 1.Industrial Disaster.

. In various industries we have to measure temperature from various locations. In hazardous area we cannot enter. So temperature measurement and logging becomes complicated. To avoid this problem we have to think about. Wireless technology, i.e. we have to measure the temperature humidity and Light without from remote area. This project does the same function. This project is based on microcontroller PIC 16F877, which is 8-bit. The Parameters from remote area are given to computer through RF transmitter and RF receiver. it is send to LCD using RF transmitter and receiver module. After predefined time data is logged on computer .Further analysis is done as follows:

- At the starting first we have to connect the COM port,
- Temperature is measured, displayed LIGHT level
- Then that data is send to RF transmitter.
- At the receiver end there is RF receiver which will take the transmitted data.

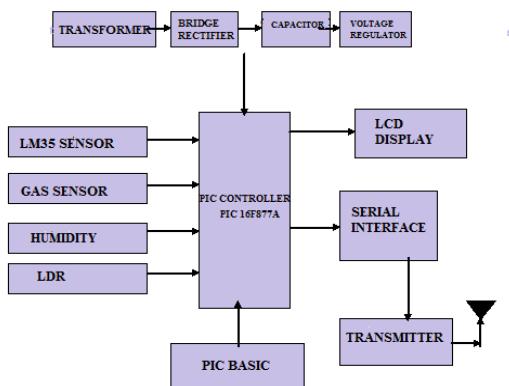


Fig 2. Block Diagram 1

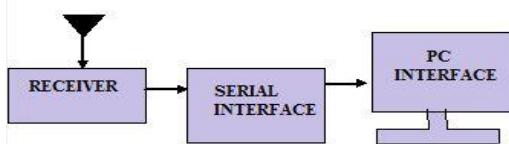


Fig 3. Block Diagram 2

II. SYSTEM MODEL

A. POWER SUPPLY:

This unit will supply the various voltage requirements of each unit. This will be consists of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier. It will convert 230VAC into desired 5V/12V DC

B. PIC-MICROCONTROLLER

This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In short we can say that the complete intelligence of the project resides in the software code embedded in the PIC- Microcontroller. The controller here user will be of PIC 16F8771. The code will be written in Embedded C and will be burned or programmed into the code memory using a programmer. This unit requires +5VDC for it proper operation.

C. HUMIDITY SENSOR

Humidity sensor HSY-220 is mostly used in places where there is need to control the humidity such as food preservation industries, clothing etc. This capacitive atmospheric humidity sensor consists of a non-conductive foil, which is covered on both sides with a layer of gold. The dielectric constant of the foil changes as a function of the relative humidity of the ambient atmosphere and accordingly, the capacitance value of the sensor is a measure for relative humidity. Relative humidity is a measure, in percentage, of the vapour in the air compared to the total amount of vapour that could be held in the air at a given temperature.

D. LDR SENSOR

The Light Dependent Resistor (LDR) are used in places where there is need to control the Intensity and level of light especially for protecting photo films and frames. An LDR is made of semiconductor material. It has a high resistance because the vast majority of the electrons are locked into the crystal lattice and unable to move. Therefore in this state there is a high LDR resistance. As light falls on the semiconductor, the light photons are absorbed by the semiconductor lattice and some of their energy is transferred to the electrons. This gives some of them sufficient energy to break free from the crystal lattice so that they can then conduct electricity. This results in a lowering of the resistance of the semiconductor and hence the overall LDR resistance. This data is given to microcontroller.

E. TEMPERATURE

The Temperature sensor LM-35 is used for detecting the physical parameter temperature of the particular device or the place where the product is stored or manufactured. It produces an output voltage which is proportional to Celsius temperature. It is a three pin device out of which the middle pin is used to measure the output voltage. It transmits the data to microcontroller.

F. GAS SENSOR

The GAS sensor MQ-6 can be used both in home and industry. It has a very high sensitivity to gases such as LPG,Iso-Butane, Propane. Sensor is composed of 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 enveloped MQ-6 have 6 pin , 4 of them are used to fetch signals, and other 2 are used for providing heating current.

G. LCD 16x2

It is called Liquid Crystal Display. We are going to use 16x2 character LCD. This will be connected to microcontroller. The job of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface. This unit requires +5VDC for it proper operation.

H. RF TRANSRECEIVER

RF modem has frequency of 2.4 GHZ and ranges upto 30Mts. RF modem can be used for applications that need two way wireless data transmission. It features adjustable data rate and reliable transmission distance. The communication protocol is self controlled and completely transparent to user interface. The module can be embedded to your current design so that wireless communication can be set up easily.

III. FEATURES OF RF MODEL

- Automatic switching between TX and RX mode.
- FSK technology, half duplex mode, robust to interference.
- 2.4 GHz band, no need to apply frequency usage license.
- High sensitivity, reliable transmission range.
- Stable, small size, easier mounting.
- Error checking(CRC) of data in built

IV. DESCRIPTION OF RF MODEL

This module works in half-duplex mode. Means it can either transmit or receive but not both at same time. After each transmission, module will be switched to receiver mode automatically. The LED for TX and RX indicates whether IC is currently receiving or transmitting data. The data sent is checked for CRC error if any. If chip is transmitting and any data is input to transmit, it will be kept in buffer for next transmission cycle. It has internal 64 bytes of buffer for incoming data. When you power on the unit, the TX LED will briefly blink indicating that initialisation is done. After this, the module is ready to receive data. The module has a built-in antenna and can be used with a simple antenna or a dipole antenna.

initialization is complete and it is ready to use. The RX LED is directly on TX OUT pin to indicate that actual data is received and it is sent to output pin.

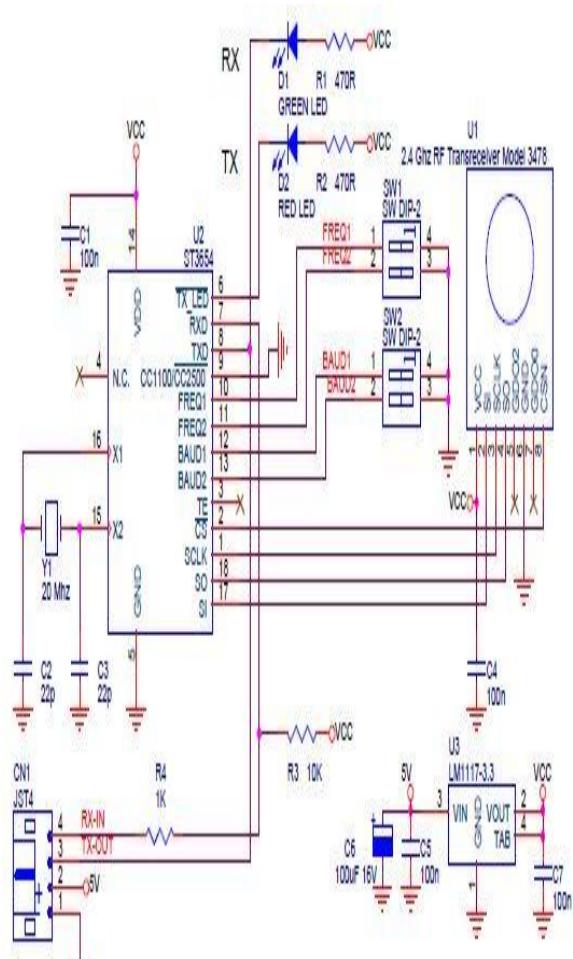


Fig 4. RF Modem

V. INTERFACING WITH MAX 232

If you wish to interface the module with RS232 level like a PC serial port or any other device you need a level convertor such as MAX232. It will appear as virtual serial port on PC to which you can communicate two ways through any software which can transmit / receive by this serial port. **the MAX-23** includes a Charge Pump, which generates +10V and -10V from a single 5v supply. This I.C. also includes two receivers and two transmitters in the same package. This is handy in many cases when you only want to use the Transmit and Receive data Lines.

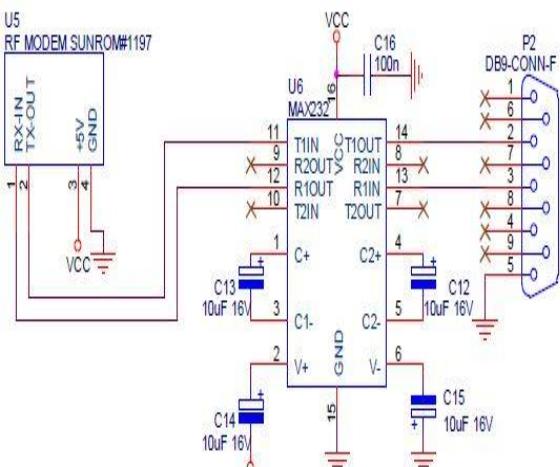


Fig 5. max 232

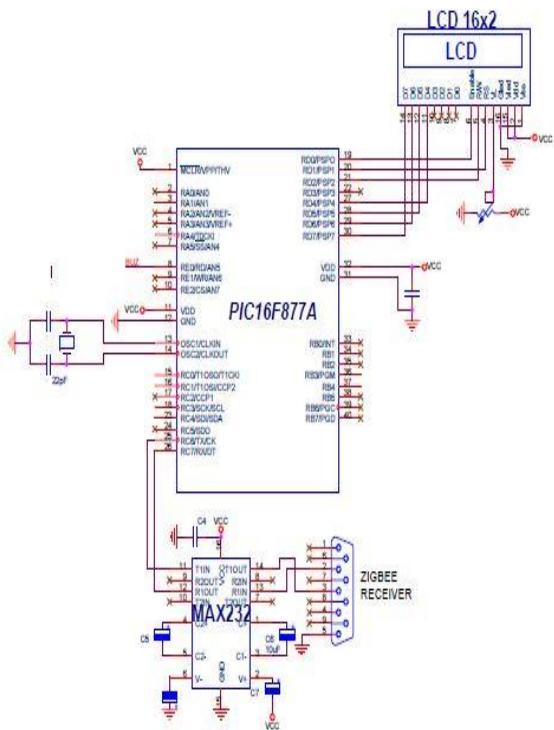


Fig 6. Data Receiver

VI.SOFTWARE DESCRIPTION

The Pic-Basic Pro Compiler is the easiest way to program the fast and powerful Microchip Technology PIC-micro microcontrollers. Pic-Basic Pro converts BASIC programs into files that can be programmed directly into a PIC-microMCU. The Pic-Basic Pro Compiler features: BASIC commands, direct and library routine access to pins on PORT A, C, D, E, as well as PORT B, arrays, real IF..THEN..ELSE and interrupt processing in BASIC. The Pic-Basic Pro Compiler gives direct access to all of the PIC-micro MCU registers - I/O ports, A/D converters, hardware serial ports, etc. - easily and in BASIC. It automatically takes care of the page boundaries and RAM banks. It even includes built-in commands to control

intelligent LCD modules. The Pic-Basic Pro Compiler is a DOS command line application (it also works in Windows) and runs on PC compatibles.

The Pic-Basic Pro Compiler can also be used inside Microchip's MPLAB IDE. This allows programs to be edited and simulated within Windows. More information is on the MPLAB page. Pic-Basic Pro Compiler now has limited support for the 12-bit core microcontrollers and BASIC source-level debugging.

CONCLUSION

By the realization of the above proposed system we can make use of wireless technology in industries more efficient and can reduce the labor cost in industry. By the realization of the above proposed system one can learn many aspects of a wireless technology. This paper provides a better way to control industrial machineries and monitor the industrial environment to provide safety and improve the quality of the product. This paper proposes the wireless sensor network based automation and monitoring activities. This method will reduce the cost and maintenance of the industrial environment automation and safety in future.

FUTURE SCOPE

The future goal of this project will be to send data in bi-directional and to aid further development of bi-directional communication between PC and remote area. A user should be able to operate the data in full duplex mode i.e. transmit and receive simultaneously. Data can be broadcasted and data send will be enable to reach multiple recipients and even by adopting various system technology, we can be able to automate industrial process in future.

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