Monitoring and controlling of modern industrial automation using temperature sensor

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***Abstract*- Now a days most of the industry of large section has a very complicated to monitoring, controlling of each unit. It requires the more man power, and time consumption. In our technology used to overcome this about factor to make single person monitoring. In this process achieved by PIC-microcontroller and CAN bus network which are the main purpose of our paper. The both of the PIC-microcontroller and CAN network are cost effective.**

***Index terms*-CAN, GSM, temperature control, PIC-microcontroller**

I. INTRODUCTION

The automation field is very fast growing industry in globally. In industries have different parameters like temperature, pressure etc controlled. Hence there is a requirement of additional circuit to measure this different parameter. These additional circuit lead to get efficiency. In a single window is lead to the use of multichannel method monitoring. So with the aim of achieve this, CAN (Controller Area Network) protocol can be selected. A **Controller Area Network** (**CAN Bus**) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other in applications without a host computer. It is a message-based protocol, designed originally for multiplex electrical wiring within automobiles, but is also used in many other contexts.CAN bus starts in 1983 at Robert Bosch GmbH.

The protocol was officially released in 1986 at the Society of Automotive Engineers (SAE) conference in Detroit, Michigan. The first CAN controller chips, produced by Intel and Philips, came on the market in 1987. The 1988 BMW 8 Series was the first production vehicle to feature a CAN-based multiplex wiring system. However, at the moment, the focal point is more on wireless, spread, sensing nodes. A typical smart system is made up of both digital and analog components, which allow the sensor data to be captured, transformed, analyzed, and transmitted to other modules in the system. But by applying the CAN protocol to a smart network is a natural development from existing networks. It will prove itself well-organized and financial media for communication. The CAN bus provides an ideal platform for interconnecting modules and allows each module to communicate with any other module. A network system which requires fast and tough communication and where data should maintain high reliability CAN-can be used. The CAN protocol is robust and uses complicated error checking and handling, which allows errors and failures to occur without closing the entire system down which is useful in the motor control node.

By using the multiprocessor and CAN protocol is performed in low-priced industrial automation. In this system is embedded based. An **embedded system** is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. An **embedded system** is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. 98 percent of all microprocessors are manufactured as components of embedded systems.

II. EXISTING METHOD

In previous days only find out the trouble in the industrial automation. But in our technology is used to find the problem and at the same time that trouble should be corrected otherwise that process going to shut down by the means of the special slave to get the details of the trouble that is where it is occurred. It is send to a higher authority or supervisor by using GSM. The supervisor to request the send address to repay any message to stop this process. In this method is used to avoid the machine damage.

III. PROPOSED SYSTEM DESIGN

From the current problem section, it can be seen that, existing technology are insufficient to handle the problems of measuring the temperature, pressure, etc. to overcome these problem, we propose to implement our modern industry automation. The block diagram of proposed system is shown in below.

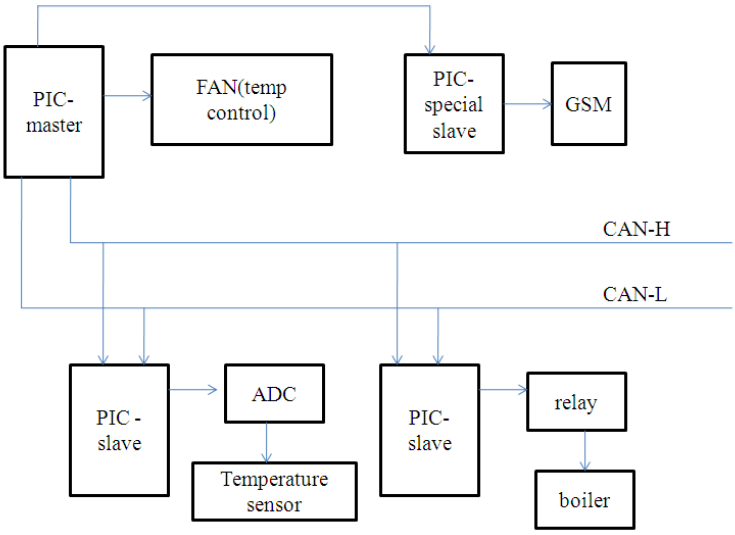

Fig1.block diagram of design of modern industrial automation

There are many slaves and one master is used. Now we consider use only one slave in this section. For all time masters only initiates the communication. Every time the master asks for the temperature to slave. The slave measures temperature level of the boiler and senses the those values to the master module by means of CAN protocol after converting values into digital values by using A/D converter. The master unit displays temperature values on the LCD.

If the temperature point of the boiler is higher than a threshold value, the cooling fan is automatically turned ON and the relay is made to turn off the boiler, and at the same time the message will be sent to a higher authority or supervisor about the abnormal state using GSM (global system for mobile communication). If the temperature value is lower than the threshold value, the relay is turned to ON in order to heat the boiler

A.PIC MICROCONTROLLER

PIC microcontrollers are a family of specialized microcontroller chips produced by Microchip Technology in Chandler, Arizona. The acronym PIC stands for "peripheral interface controller," although that term is rarely used nowadays.PIC16F877A, this is probably the most popular PIC used by the hobbyist community that is still under production. This is the best PIC of its family and used to be "the PIC" for bigger hobbyist projects, along with the PIC16F84 for smaller ones. Features 14KB of program memory, 368 bytes of RAM, a 40 pin package, 2 CPP modules, 8 ADC channels capable of 10-bit each. It also counts with the UART and MSSP, which is a SSP capable of being master, controlling any devices connected to the I2c and SPI busses. The lack of internal oscillator, as opposed to the other PICs mentioned until now, is something to be aware of. Also, this PIC is relatively expensive for the features included. This may be caused by Microchip to force the migration to better chips

B.GSM MODULE

Here, a GSM modem is connected with the microcontroller .This allows the system to use the GSM modern to communicate over the mobile network. These GSM modern are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS. So GSM is an intermediate from system to supervisor and to update the information from microcontroller to supervisor.

C. ANALOG TO DIGITAL CONVERTOR

A/D converters translate analog electrical signals for data processing purposes. With products matching performance, power, cost, and size needs, Analog Devices offers the industry's largest A/D converter portfolio. As the world's leading provider, these data converters enable accurate and reliable conversion performance in a range of applications such as communications, energy, healthcare, instrumentation and measurement, motor and power control, industrial automation, and aerospace/defense. A variety of A/D converter resources are provided to assist the engineer in every project phase, from product selection to circuit design.

Fig.2 A to D converter

Fig.2. Shows Analog-to-digital conversion is an electronic process in which a continuously variable (analog) signal is changed, without altering its essential content, into a multi-level (digital) signal. An Analog to Digital Converter (ADC) is a very useful feature that converts an analog voltage on a pin to a digital number. By converting from the analog world to the digital world, we can begin to use electronics to interface to the analog world around us.

IV. HARDWARE DESIGN

Totally four PIC-microcontroller are used here in the system modules and a special section used to sending message to higher authority person or supervisor. The master unit is used to connect the all parameter processing unit, relay unit and special unit.

(i) TEMPERATURE SENSORLM-35

The LM35 series are accuracy integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius temperature. The LM35 is operates at -55˚ to +120˚C.. Temperature is one of the most commonly measured variables and it is therefore not surprising that there are many ways of sensing it. Temperature sensing can be done either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead.

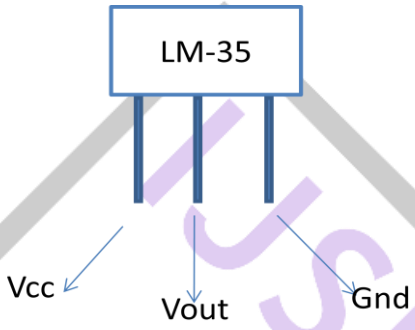

Fig.2 symbol of temperature sensor

There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors. The important characteristic of the LM35 is that it draws only 60 micro amps from its supply and possesses a low self-heating capability

(ii) Power circuit

The operating voltage range of PIC-microcontroller is 5V.The circuit of LM7805 is a +5.0V,1A voltage regulator is used. It is a linear voltage of +5v DC. The LM7805 is shown in below.

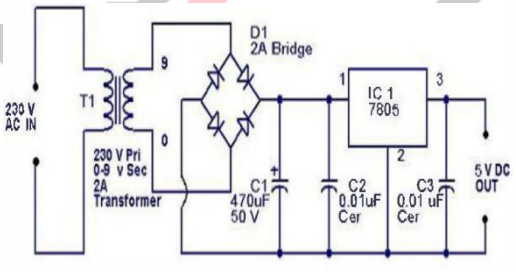

Fig.3 power circuit

(iii) Cooling fan

If the temperature value is higher than the predefined limit, the cooling fan will start operate continuously. Fan speeds may be controlled manually, thermally, or by the computer hardware or by software. It is also possible to run many 12V fans from the 5V supply, at the expense of airflow, but with reduced noise levels.

V. EXPERIMENTAL AND SIMULATION RESULT

The whole automation and control system is split into two levels. First level is the industrial parameter processing level i.e., slaves. The second level is the automation and control level that is master. The overall hardware setup of industrial automation and controlling system. In the first, temperature sensor is connected to microcontroller. The LCD is connected to port 0 of the microcontroller in the master order to display the instantaneous values of parameters. Control signal for LCD are obtained from port 2. The master is interfaced with special slave for interrupt purpose. The simulated output of one of the processing level i.e. temperature sensor circuit, using proteus schematic software.

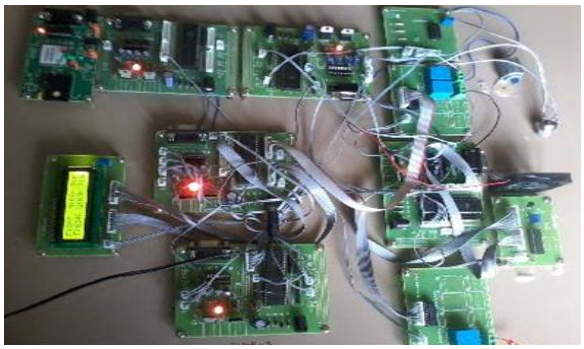

Fig.4 overall hardware setup

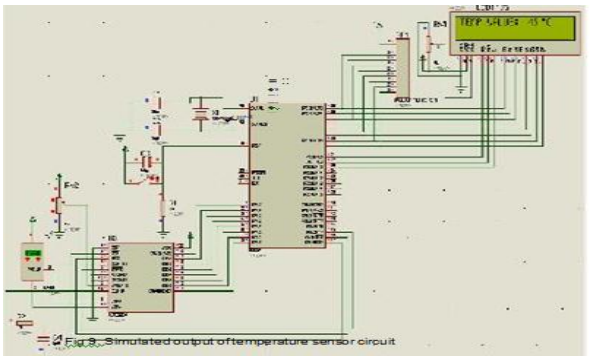

Fig.5 simulated output of temperature sensor circuit

VI. CONCLUSION

The main goal of this paper is to control and monitor the abnormal and normal values. In this brief, operations of low cost and time management system for monitoring issue of an industrial boiler, based on multiprocessor communications are discussed. The monitoring parameters are temperature, gas level of the boiler and etc. Communication of information from plant to control room is made in miscarry safe and effective manner by CAN serial communication protocol. In proposed systems on the spot values of process parameter are displayed in LCD and Usual and unusual conditions are viewed in the LCD. Control circuits are enabled and disabled as per the program logic. This paper is concerned about implementation of low cost system for monitoring parameters of an industrial based on multiprocessor communication.

VI.FUTURE SCOPE

With automatic industrial control based on the CAN protocol in the system, the manual effort on the part of the employee is saved. As the entire system is automated, it requires very less human intervention. We are controlling and monitoring the process in industries through GSM. Currently, we have implemented system by considering one industry. It can be improved by extending to two or more industries.

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