# INDUSTRIAL AUTOMATION USING EMBEDDED SYSTEM

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**Abstract-** For modern industries automation the some automatic and manual methods are implemented. By the use of manual methods which leads to some inaccuracy and great losses takes place basically for all these industries. By considering all these factors we have design the system. This implemented system which can automatically done all the process through the microcontroller. The every operation is executed via the microcontroller. The loading operation of raw material is done through a belt conveyor system where the buckets are arranged. As the microcontroller triggers a buffer stage it drives a DC motor switching ON the motor running up to the required level of quantity of raw material. After completion of first operation, the furnace has to be heated to a particular temperature so that the solid raw material melts to its molten state. When the required temperature is reached the heater is switched-off by the Microcontroller. The next operations are executed step by step through microcontroller.

**Keywords-Microcontroller, Relay, Temperature Sensor, Fire sensor, Smoke sensor,Encoder, Decoder**

## I. INTRODUCTION

This paper provides industrial automation by using the 8051 microcontroller.For modern industries automation the some automatic and manual methods are implemented which leads to some inaccuracy and great losses takes place basically for all these industries the raw material has to be loaded into the furnace with required quantity, the furnace has to be heated through an induction heating system to melt the raw material to its molten state. This melted material has to be poured into the molds to get a shape. Finally the molds have to be cooled to solidify the material. To development this which is fully automated industrial applications and also it generate the Alerts/Alarms using concept of microcontroller whenever it is necessary. This alert or alarm is produced by the use of the sensors they are temperature sensor, fire sensor and the smoke sensor. This is done step by step through the 8051 microcontroller. This system is cost effective i.e. the programming and working of the system is very easy to operate.

## II. PROBLEM STATEMENT

Technology has advanced so much from the last ten years and results in comfortable life. This provides more comfortable life, this provide the control of device, machine from one place to the another place with the computerized operations it saves lot of the time and it provide more effect. To develop a system that has develop to monitor automatically by using sensors, actuators ect in the industrial applications this will helps in generation or producing Alerts/Alarms using concept of microcontroller. And furthermore plan the framework to Take Intelligent Decision and Control Devices. This system can be implemented with minimum cost compare to the other automated industry which uses the Plc, IoT and other computer software. The system we have proposed is a simple approach to automating the small scale industry.

## III. OBJECTIVE OF PROJECT

To develop the system that helps in the increases in the production and decreases in the manufacturing lead time and also the reducing the net cost of implementation of the industry automation.

## IV. BLOCK DIAGRAM

**Microcontroller:** The microcontroller used here is 89V51RD2 40 pin DIP with inbuilt 64k flash memory with 4 I/O ports and 3 timers, and a serial port communicate with MAX 232 interface with serial protocol with TX and RX pins which are at port 3.

**Raw material loader:** The raw material is loaded in to the furnace with the help of belt conveyor system which is fitted with small buckets which loads and picks the raw material. The belt conveyor system is connected with bidirectional DC motor.

**Buffer and driving unit:** The buffer stage is designed with buffer IC which drives the signals from microcontroller to the DC motor stage by an isolation method. The fan out of microcontroller is very less in terms of amps so not possible driving directly.

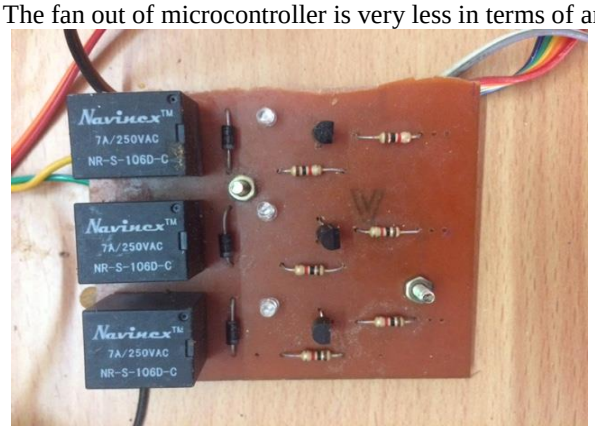


**Fig 2** Relay board

**Furnace tilting system:** Once the material liquefied in the furnace it needs to be filled in to the molds so the furnace needs to tilt in clock and anticlockwise direction.

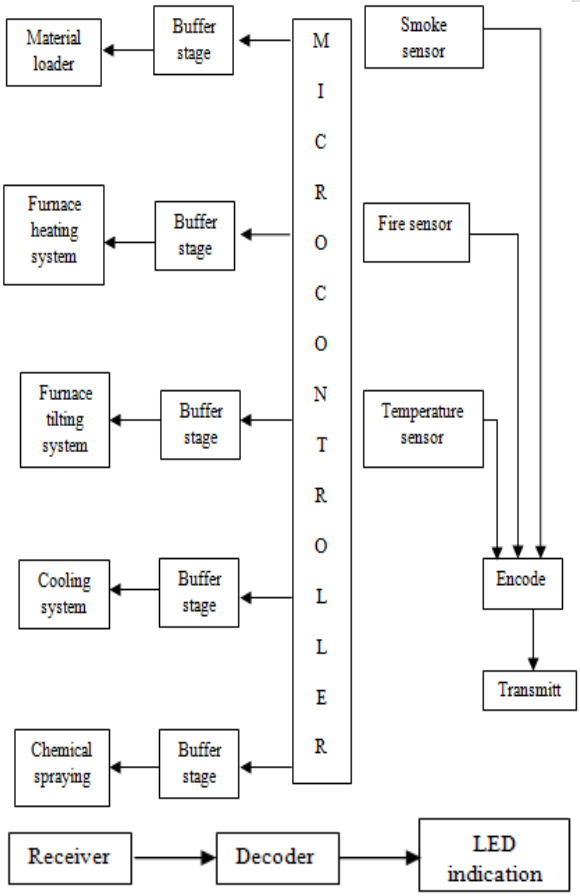


**Fig 1** Block diagram

The furnace system is connected to a DC motor which is bidirectional and this drives through the bidirectional motor controller IC. The control signals for the motor are generated from the microcontroller. **Cooling system:** After the process of heating and filling in to the molds the molds need to be solid by cooling method. The cooling is done with instrument cooling fan which drives and blow the cool air in to molds. The control signal generated from microcontroller and the required time to solidify the material in to solid product. **Furnace system:** The furnace is used to liquefy the solid metal with induction heating system.

**Chemical spraying:** The solid product comes out after the process of cooling sometimes needs coating and spraying certain chemical layer.

**Temperature sensor:**For the safety point of view the industry can be monitored with over temperature sensing by using a Thermistor and op amp comparator.

**Smoke sensor**: For the purpose of sensing parameter from the industry smoke e can be monitored.

## VI. SOFTWARE CONFIGURATION

**6.1 KEIL software:** In the keil software these are the steps to write an assembly language program and also to compile it**:**

1. At first install the software in PC by using internet or CD.
2. The icon will be created, and named as "Keil uVision3".
3. To start click on the icon two times or double click on it.
4. The project workspace is shown in the page at the left side, and output window at the bottom.
5. Now press the project and open it.
6. In the project, go to new project option and click on it.
7. A window will name "Create new project" will open. Give the project name.
8. When the file is saved then the list of vendors file will open on the screen, and then the device has to be selected.
9. Atmel is the commonly used vendor. So search in the list and click on it, it depends on the type of the microcontroller used.
10. The after completing step 9 then selects the any one of microcontroller as you required in your work. Now then press "ok".
11. The window will open, in the window it shows whether to copy the start up code into the file or not, then press the "no" to process further.
12. Now at the right hand side click on target and source file.
13. Go to "file" and in "new". A workspace will open then start writing the program.
14. After writing is completed then save it with .asm extension name.
15. After saving is completed add the target files by clicking on the source group. Then choice "Add files to the source group".
16. Press the right button and select the target and select option for the target. Set the frequency to 11.0592MHz, this will help to interface with the PC.
17. Then select or go to option "output" and give name for the hex file (create HEX file).
18. Now click on the build the target. Then target is built if error occur then rectify these error.
19. Then press the icon "d" to debug. After debugging the output is exhausted.

**6.2 Microcontroller Simulation:** The microcontroller simulation is used in the "Proteus software". It works by applying microcontroller's part on the schematic and the files may be the hex files or a debug file. The analog and digital electronics devices are connected as required in the project. The all project prototypes are connected to the microcontroller such as motor control, temperature control and user interface design etc. the microcontroller simulation support the some of the co-simulation they are microchip technologies as PIC10,12,16,18,24,dsPIC33 microcontroller, 8051, Atmel etc.

## VI. RESULT

In this project we have accomplished the assembly of the microcontroller based industrial automation with objectives of economically inexpensive, reliable and compatible. Simulation is carried out in keil software and the proteus software.

## VII. CONCLUSION

Recent development in the science and technology provide a wide range of scope of application in reduction power wastage in the industry. This project is useful in domestic as well in the industrial applications. It has the scope to enhance several devices by appropriate add-on circuits. By this method it's possible to execute the operations in the industry with safety measures and also reduce the manpower and increase the productivity. Less losses and more accuracy. It's possible by changing the program suitable for any industry.

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