

Home Automation for Industrial Machinery

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ABSTRACT- Automation is a use of various systems for operating certain equipment's such as different machines made for certain tasks without any human interference. Automation in Electronics Engineering is design of certain control systems use to control home appliances with precise aim to saving time of the end user. It aims to provide easy accessibility for controlling certain appliances in home and office environment such as switching ON/OFF of fans, lights and other appliances in our daily use, with practical ease and save the end users time. In different industries like construction, mechanical, oil gas and others where heavy machinery is involved and risk of human injuries due to handling heavy and complicated machinery is high. This paper aims to provide a solution to this problem and tries to give a unique solution to the dangerous problem.

Index Terms- Automation, Controller, Home Automation, RF technology, Heavy machinery.



I. INTRODUCTION

In today's competitive and fast paced world our lives have also become fast paced and time is the most valuable asset today. Communication has played a major role in bringing the world closer. Home automation system deals with the control of home appliances with a help of a remote. The latest application of this technology is to enable users to control machines and appliances to their own comfort.

The main aim of this paper is to provide a solution consisting of microcontroller based low

cost, compact module which will basically have two units-

- Transmitter unit for sending control code.
- Receiver for accepting code. Consisting of microcontroller and LCD display.

The main motive behind this paper is to show how home automation works and application of home automation in controlling heavy and dangerous machinery in different industries.

1. TRANSMITTER UNIT

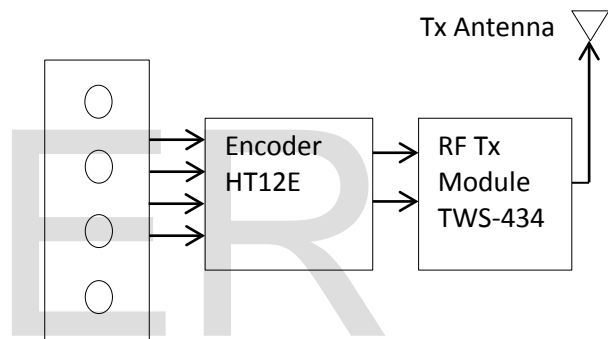


Figure 1 Transmitter Block Diagram

Transmitter block diagram is as shown in the figure above. The main components of transmitter are push buttons, encoder and transmitting antenna. On press of the button, a code is generated. Encoder generates that code. RF transmitter modulates the encoded code and transmits it.

The encoder used here is HT12E. The encoder receives electrical signals from push buttons. It generates a four word code signal in the form of 1's and 0's.

The RF transmitter module used is TWS-434 RF transmitter. It works on 433.92 MHz frequency. The main function of this module is wireless transmission of data by digital radio signals at a particular frequency.

The main function of antenna is to transmit the digitally encoded and radio modulated signal via air medium.

2. RECEIVER UNIT

The receiver unit's block diagram is as shown in the figure. It consists of receiving antenna, microcontroller, TRIAC, decoder and other supporting components like opto-coupler PIC controller, LCD display.

Antenna used is a simple basic antenna. It can be a small piece of copper wire. It receives the RF modulated code from the transmitter.

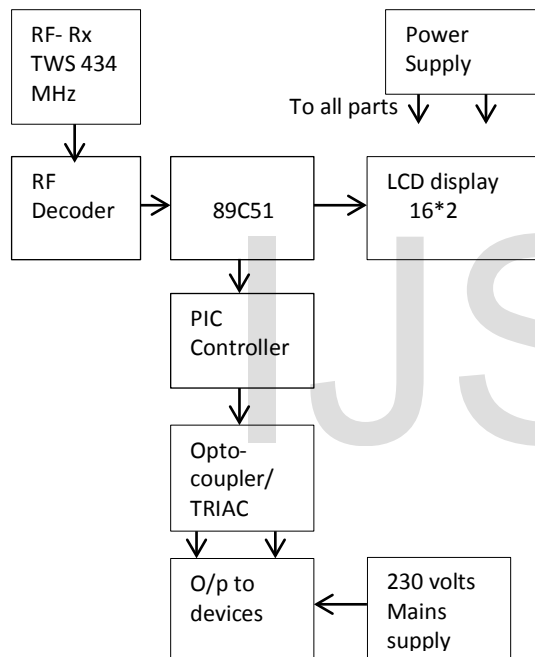


Figure 2 Receiver Block Diagram

The received code is then decoded by decoder HT12D. The decoded code is passed to microcontroller. Microcontroller reads the code and identifies the function to be performed and the device on which it is to be performed. At the same time, the microcontroller displays the function on LCD display. The instruction from microcontroller is then given to PIC controller which actually controls the device and performs functions like switching and intensity control of devices.

II. PROBLEM FACED IN INDUSTRIES

In industries like chemical manufacturing, where big boilers are used, bottling plants, with big conveyor belts and machines for making bottles and many more industries involving heavy machinery with controllers and control panel have to be under constant supervision of technical personnel and it is mandatory for him to be present at the site at all the time. This results in redundancy in workforce. The same personnel could be utilized at other work in the industry where his expertise is needed and where more work forces is required. The second problem is that there is always room for human error.

As a solution to the above mentioned problem we could use home appliance controller for controlling those parameters mentioned above. Following are the ways in which the solution to the above mentioned problems can be achieved:-

1. The small RF circuit is connected to the device which is to be controlled and with the press of a button on the remote control of the circuit different actions can be performed upon the connected device like controlling speed and turning On/OFF of the device.
2. For a timely ON/OFF of the devices we can program a microcontroller for particular time.
3. By using this home appliance controller we can simply control any devices from remote location by just a press of a button another efficient way of controlling is by using a microcontroller and personal computer to control an appliance by selecting a control word using transmitter placed in a remote location and a receiver to enable receiving action.

III. MACHINERIES USED IN HEAVY INDUSTRY

Heavy industries are those industries which produce heavy products or involve heavy processes leading to the production of these products. There are different kinds of heavy industries that belong to this category they are construction, aerospace industry, defense industry, oil and natural gas industry, chemical industry and many more.

Naturally these industries involve heavy machinery in their workings like boilers in chemical industry, pipelines and machines in oil and natural gas industry.

BOILERS

There are different definitions and applications of boilers. The most common application of boilers is for the purpose of heating and producing steam from water. Apart from heating water there are also other applications of boilers like power generation, steam engine, in chemical plants, in power plants, industrial steam generation and many more.

The basic working of a boiler with diagram is as explained below.

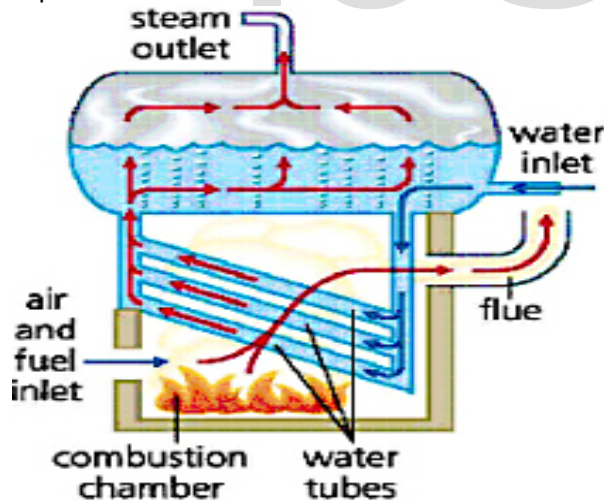


Figure 3 Basic Boiler

The home automation system can be interfaced with the boilers in order to save time wasted in manning the boilers. By interfacing the basic home automation circuit to the boiler circuitry a total control over the operation of the boilers can be bought. With the help of this circuit the

switching process of the boiler can be done from a remote location. Also the heat intensity and the steam flow can be controlled with the use of this circuit.

The home automation circuit uses microprocessor so other sensors can also be connected to the circuit like temperature sensor and pressure sensors.

An example of implementation of this circuit for boilers is shown in the figure below.

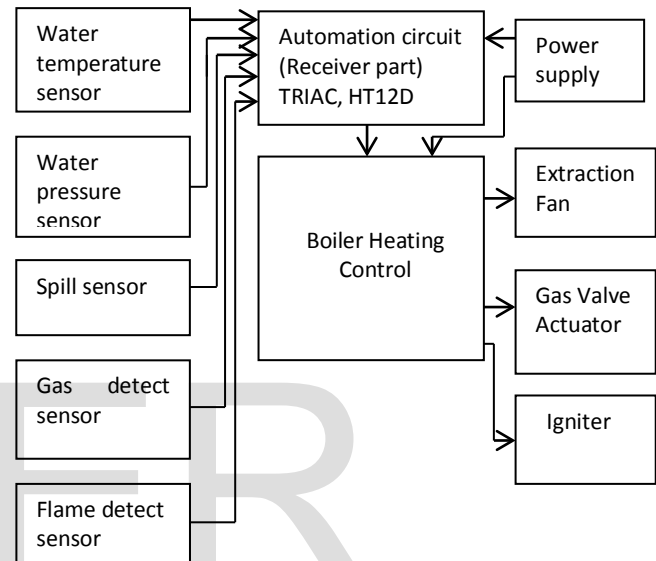


Figure 4 Block Diagram Implementation with Boilers

As can be noted from the figure above the receiver circuit of the home automation system is connected to the boiler system. All the sensors are controlled by the microprocessor through the decoder IC HT12D.

It is possible to connect as many as sensors to the microcontroller ports. All the sensor readings can be displayed on the receiver side on a LCD display through appropriate programming. The functioning of the boiler is possible from any remote location with the help of a receiver in the form of a remote.

IV. FORMS OF AUTOMATION IN INDUSTRIES

The field of industrial automation has seen significant amount of advances due to the availability of new technologies. Some new technologies like virtualization, cloud applications and wireless are transforming manufacturing and taking industrial automation to higher levels.

Some of the industries that make use of automatic robots for the process of manufacturing include the automobile industries. With the help of new automated robots developed the automobile industry has made a lot of progress and taken manufacturing of cars to a higher level involving good speed for completion of the product.



Figure 5 Automation in Car manufacturing

Other industries which make use of automation are food and beverages industry, entertainment industry, fiber and textile industry, oil and natural gas, pulp paper industry, semiconductor and electronics tire and rubber industry.

V. FUTURE SCOPE

Automation systems have a brighter future in different industries as discussed earlier. Some of the areas where it can be used are:-

1. In industries for control mechanics.

2. For temperature control in industries where heat is essential.
3. Using micro technology the size of kit can be decreased further.
4. Using other wireless technology the range can be increased.
5. Development of accurate and precise kit will help to implement this in huge industries.

VI. CONCLUSION

As discussed earlier the home automation system can be used to control heavy machinery in huge industry. The controlling can be done with the help of a small portable remote.

The concept is further explained with the help of a simple system and how the automation system can be integrated and implemented in that system.

VII. REFERENCES

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