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INDUSTRIAL ELECTRICAL DEVICES CONTROL THROUGH GSM

[1]M.Nagaraju, [2]M.Kranthi Kumar, [3]V.Satyavardhan Rao, [4]P.KrishnaManikanta,
[1,2,3&4]Department of Electrical and Electronics Engineering
Mother Teresa Institute of Science & Technology, Sathupally, India.

ABSTRACT

In industries, there will be various loads to be operated and these loads are to be operated at some specific intervals according to our requirements and also based on the device constraints. For these purposes, a person should be employed to monitor the status of the loads. But there may be chances that the person may forget to operate these loadsAnd also it is not an easy task for a person to operate these loads manually as these loads run with high currents and high power consumption. This project gives the best solution for electrical power wastage This project is not only limited to industrial applications but can also be extended to domestic purposes for home appliances controlling using GSM technology. The devices can be switched ON/OFF using GSM technology without actually going near the switch boards or regulators. The loads like lights, motors, heaters, power controlling system and also current through the loads can be controlled in this project. We can control all loads at a time from a remote place without connecting any physical wire between loads and remote place. This project is designed in such that a GSM modem is interfaced to the controller through serial port interface. Along with the AC devices/loads which are to be controlled by using GSM will be interfaced to the controller through the relays. The GSM modem performs the task of receiving the message from the mobile and sending the messages to the mobile from the controlling unit. If the user wishes to control the devices ON/OFF in industries, he has to send a predefined message to the modem from his mobile. The GSM modem receives this message and intimates the same to the microcontroller.

1. INDUSTRIAL ELECTRICAL DEVICES CONTROL THROUGH GSM

1.1 Description:

This project is aimed to design a system to control the electrical devices in industries by using GSM technology. In industries, there will be various loads to be operated and these loads are to be operated at some specific intervals according to our requirements and also based on the device constraints. For these purposes, a person should be employed to monitor the status of the loads. But there may be chances that the person may forget to operate these loads. And also it is not an easy task for a person to operate these loads manually as these loads run with high currents and high power consumption. This project gives the best solution for electrical power wastage. Also the manual operation is completely eliminated. This project is implemented on wireless technology. One of wireless communication system is GSM as it is very cheap and very easy to implement.

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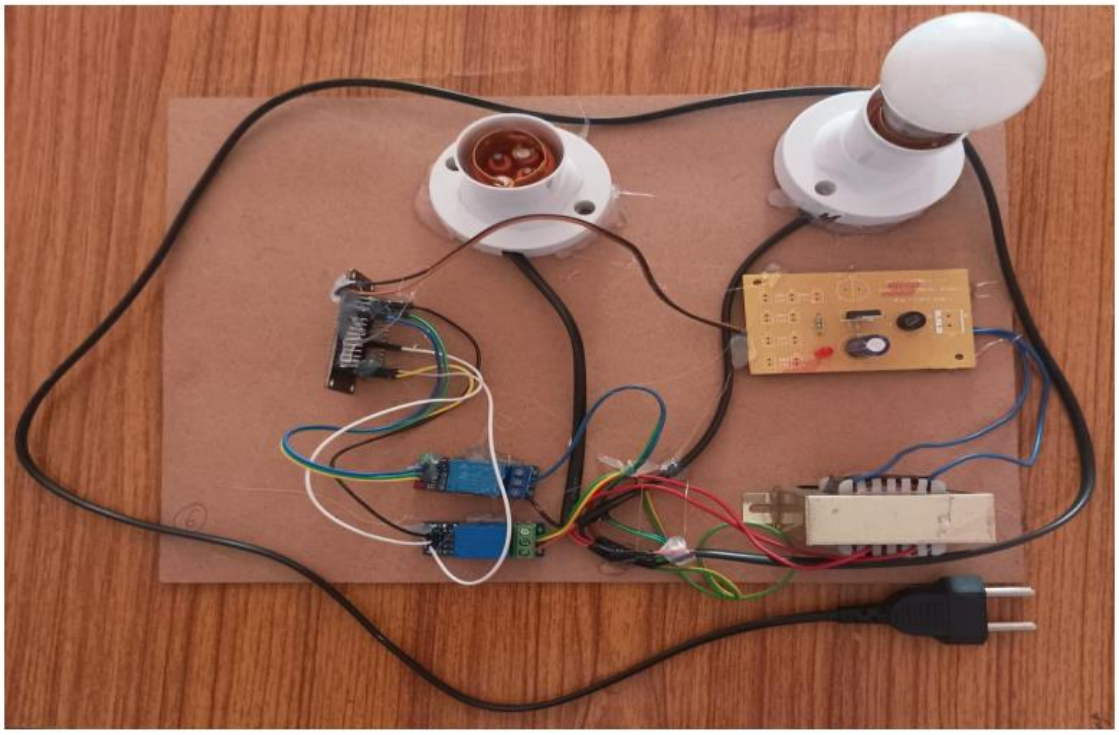

Fig 1.1 Circuit diagram

1.2 Block Diagram:

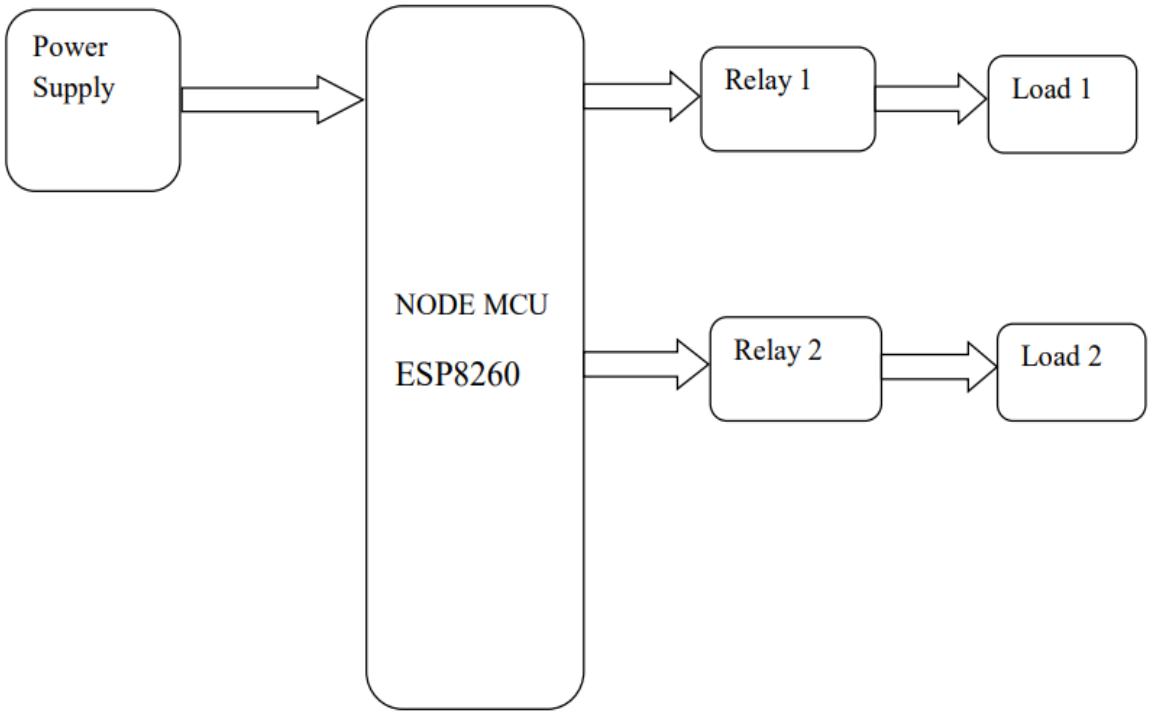

Fig 1.2 Block diagram

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2. EMBEDDED SYSTEMS

2.1 Introduction:

An embedded system is a system which is going to do a predefined specified task is the embedded system and is even defined as combination of both software and hardware. A generalpurpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. "Embedded" reflects the fact that they are an integral part of the system. At the other extreme a general-purpose computer may be used to control the operation of a large complex processing plant, and its presence will be obvious. All embedded systems are including computers or microprocessors. Some of these computers are however very simple systems as compared with a personal computer. The very simplest embedded systems are capable of performing only a single function or set of functions to meet a single predetermined purpose. In more complex systems an application program that enables the embedded system to be used for a particular purpose in a specific application determines the functioning of the embedded system. The ability to have programs means that the same embedded system can be used for a variety of different purposes. In some cases a microprocessor may be designed in such a way that application software for a particular purpose can be added to the basic software in a second process, after which it is not possible to make further changes. The applications software on such processors is sometimes referred to as firmware.

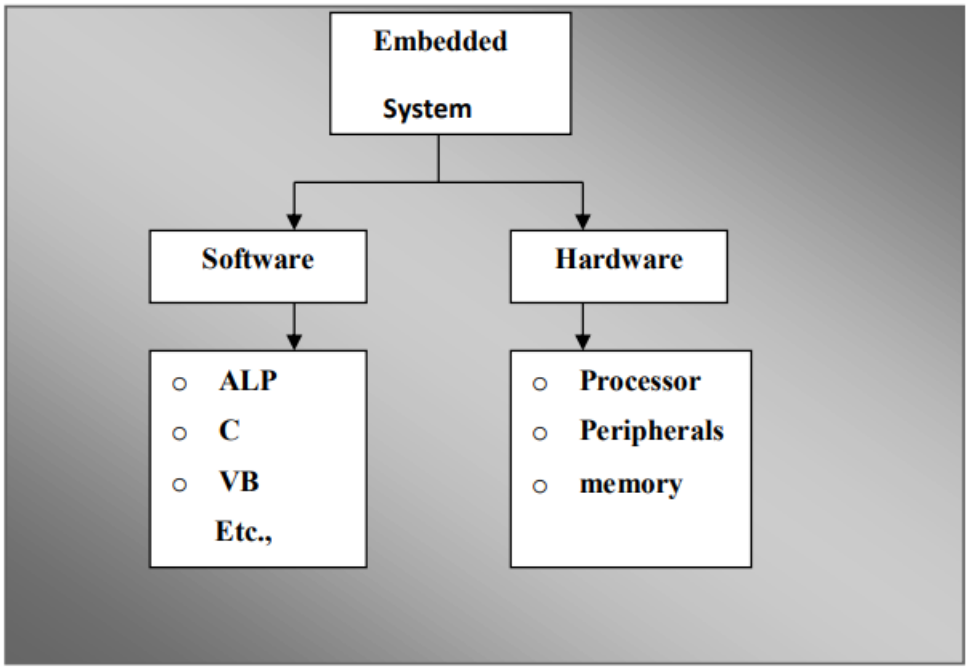

Figure2.1 : Block diagram of Embedded System

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Software deals with the languages like ALP, C, and VB etc., and Hardware deals with Processors, Peripherals, and Memory.

Three basic characteristics differentiate microprocessors:

¬ Instruction set: The set of instructions that the microprocessor can execute.

¬Bandwidth : The number of bits processed in a single instruction.

¬ Clock speed : Given in megahertz (MHz), the clock speed determines how many instructions per second the processor can execute.

2.3 Digital Signal Processors (DSPs):

Digital Signal Processors is one which performs scientific and mathematical operation. Digital Signal Processor chips - specialized microprocessors with architectures designed specifically for the types of operations required in digital signal processing. Like a general-purpose microprocessor, a DSP is a programmable device, with its own native instruction code. DSP chips are capable of carrying out millions of floating point operations per second, and like their betterknown general-purpose cousins, faster and more powerful versions are continually being introduced. DSPs can also be embedded within complex "system-on-chip" devices, often containing both analog and digital circuitry.

3. TRANSFORMER

3.1 Introduction of transformers

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors—the transformer's coils. A varying current in the first or primary winding creates a varying magnetic flux in the transformer's core, and thus a varying magnetic field through the secondary winding. This varying magnetic field induces a varying electromotive force (EMF) or "voltage" in the secondary winding. This effect is called mutual induction. Transformer is a device that converts the one form energy to another form of energy like a transducer.

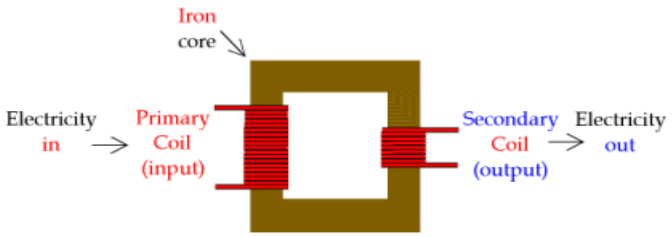

Figure 3.1 .Transformer

3.2 Classification of Transformer

¬ Step-Up Transformer

¬ Step-Down Transformer

3.2.1 Step-Down Transformer

Step down transformers are designed to reduce electrical voltage. Their primary voltage is greater than their secondary

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voltage. This kind of transformer "steps down" the voltage applied to it. For instance, a step down transformer is needed to use a 110v product in a country with a 220v supply.

Step down transformers convert electrical voltage from one level or phase configuration usually down to a lower level. They can include features for electrical isolation, power distribution, and control and instrumentation applications. Step down transformers typically rely on the principle of magnetic induction between coils to convert voltage and/or current levels.

3.2.2 Step-Up Transformer

A step up transformer has more turns of wire on the secondary coil, which makes a larger induced voltage in the secondary coil. It is called a step up transformer because the voltage output is larger than the voltage input. Step-up transformer 110v 220v design is one whose secondary voltage is greater than its primary voltage. This kind of transformer "steps up" the voltage applied to it. For instance, a step uptransformer is needed to use a 220v product in a country with a 110v supply.

4. NODE MCU

4.1 Introduction

NodeMCU is an open-source LUA based firmware developed for the ESP8266 wifi chip. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development board/kit i.e.NodeMCU Development board.

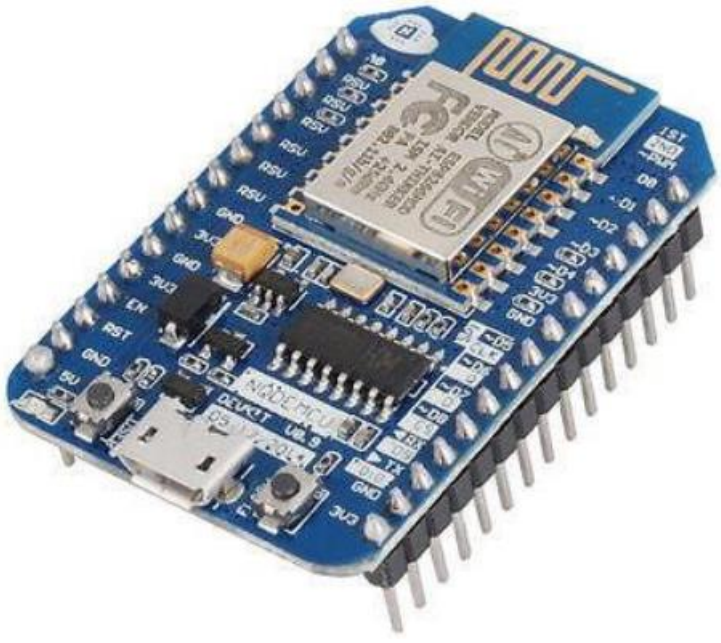

Fig 4.1:NodeMCU Development Board/kit v0.9 (Version1)

Since NodeMCU is an open-source platform, its hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The ESP8266 is a low-cost WiFi chip developed by Espressif Systems with

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TCP/IP protocol. For more information about ESP8266, you can refer to the ESP8266 WiFi Module. There is Version2 (V2) available for NodeMCU Dev Kit i.e.NodeMCU Development Board v1.0 (Version2), which usually comes in black colored PCB.

How to start with NodeMCU?

NodeMCU Development board is featured with wifi capability, analog pin, digital pins, and serial communication protocols. To get started with using NodeMCU for IoT applications first we need to know about how to write/download NodeMCU firmware in NodeMCU Development Boards. And before that where this NodeMCU firmware will get as per our requirement. There are online NodeMCU custom builds available using which we can easily get our custom NodeMCU firmware as per our requirement. To know more about how to build custom NodeMCU firmware online and download it refer to Getting started with NodeMCU

NodeMCU with ESPlorer IDE

Lua scripts are generally used to code the NodeMCU. Lua is an open-source, lightweight, embeddable scripting language built on top of C programming language. For more information about how to write Lua script for NodeMCU refer to Getting started with NodeMCU using ESPlorerIDE.

CONCLUSION

This project gives the best solution for electrical power wastage This project is not only limited to industrial applications but can also be extended to domestic purposes for home appliances controlling using GSM technology. The devices can be switched ON/OFF using GSM technology without actually going near the switch boards or regulators. The loads like lights, motors, heaters, power controlling system and also current through the loads can be controlled in this project. We can control all loads at a time from a remote place without connecting any physical wire between loads and remote place. This project is designed in such that a GSM modem is interfaced to the controller through serial port interface. Along with the AC devices/loads which are to be controlled by using GSM will be interfaced to the controller through the relays. The GSM modem performs the task of receiving the message from the mobile and sending the messages to the mobile from the controlling unit. If the user wishes to control the devices ON/OFF in industries, he has to send a predefined message to the modem from his mobile. The GSM modem receives this message and intimates the same to the microcontroller.