

PC based Electrical Load Control

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Abstract— Automations in industrial, commercial or residential sectors mostly depends upon the power systems, which requires distant controlling and monitoring. By using wireless technologies, it is more efficient to implement an appropriate technology depending upon the cost, speed and distance requirements of the proposed system. For remote controlling and monitoring of various loads/appliances and a means of efficient power utilization through real-time power consumption with the help of a PC-based GUI application. The advancement of technology things are becoming simpler and easier for us. Automated systems have more advantages over manual system. PC based control systems are highly reliable, accurate and time saving systems. They provide number of features like quick data storage, transfer data and data securities. A PIC controller based controller is designed to control a number of electrical equipment. To control and monitor connected equipment through the PC.

Key words: PIC Controller, DB Connector, Relay Driver, Relays, Level Shifter IC, Resistor, Capacitor, LED, Transformer

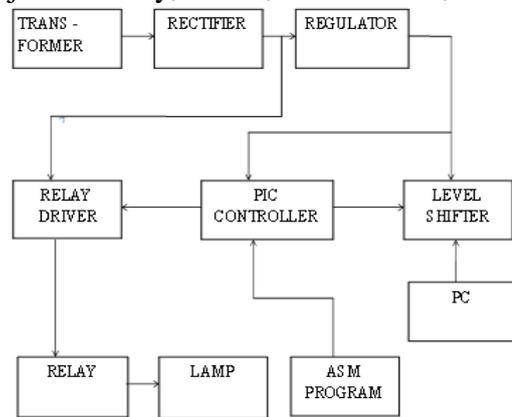


Fig. 1: Block Diagram

A. Working:

It is used to controlling, a number of electrical equipment using a PC. This system is used to control the software as well as hardware. The block diagram of PC controlled home appliances system as shown in fig.

When the power is ON initially, all IC's & relays get resets. Once any Button is pressed by user through computer control device window (GUI), computer will send command to PIC controller with the help of standard serial communication protocol (RS 232). And through PIC microcontroller relay operation take place & according that home appliance works. The developed model is connected to four loads. By giving command to individual appliances then they are turned on and off simultaneously. All the devices can work at a time. Any device can turn off as on as per requirement by giving appropriate command as shown in table.

Sr. No	Load	Control Panel	
1	Load 1	On	Off
2	Load 2	On	Off
3	Load 3	On	Off
4	Load 4	On	Off

Table 1: Load

Command can be programmed as per choice of user during programming. It is observed that developed model is working successfully. [4]

I. INTRODUCTION

In today's world there is high a demand for PC based control system because of its various advantages s over manual control system, PC based control systems are highly reliable, accurate and time saving systems, they provide number of features like quick data storage, data transfer and data security which help industries to work in efficient manner In this paper, a PC based system which will control various devices like Motor, Light, and Fan etc. Designed a GUI (Graphical User Interface) on the PC and which helps to give command to the system. PIC controller is used in order to receive commands from PC and accordingly control the devices connected to it. In this way this system is completely controlled by PC.[1]

Personal computers are becoming the choice to design and implement control algorithms because it is simple to write, modify and update software programs that implement a control algorithm. Currently, someone needs to manually switch of the lights on each floor and room. This system allows a single user to operate all those light fans, or other loads from a single PC.[2]

II. OBJECTIVES

The main objective of this project is to control the electrical load\appliances through a personal computer (PC). This controlled system is available with proper security. In this project, we can control the electrical appliances ON/OFF by just being seated at one place using a PC.[3]

III. PROPOSED SYSTEM

The block diagram for the proposed system is shown here.

IV. HARDWARE DESCRIPTION

A. PIC Controller:

PIC 16F877 is one of the most advanced microcontroller from Microchip. This controller is widely used for experimental and modern applications because of its low price, wide range, high quality and ease of availability. It is ideal for applications such as machine control applications, measurement devices, study purpose, and so on.

- 1) It has high performance RISC CPU.
- 2) It has ONLY 35 instructions.
- 3) All single cycle instructions except for program branches which are two cycles.
- 4) Operating speed: clock input (200MHz). [3]

B. DB Connector:

The DB9 connector is a analog 9-pin plug of the D-Sub connector family. This connectors contain two or more parallel rows of contacts surrounded by a characteristic D-shaped metal shell. This shell is not only provides mechanical support and ensures the correct orientation, but it may also screen against electromagnetic interference. Several methods are used to connect the system circuitry to the contacts in D-sub connectors, including crimp, solder cup, PCB solder, PCB press-fit and wire wrap connections. [7]

C. Relay Driver:

- 1) ULN is Relay driver application
- 2) The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays.
- 3) It consists of seven NPN Darlington pairs that have high-voltage outputs with common-cathode clamp diode for switching inductive loads.

D. Relays:

A relay is an electrical switch that uses an electromagnet to move the switch from the OFF to ON or ON to OFF position instead of a person moving the switch. It takes a relatively small amount of power to turn on a relay.

E. Level Shifter IC:

The MAX232 is an IC that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. This MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.[5]

F. Resistor:

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act as to control current flow. In electronic circuits resistors are used to limit current flow, to adjust signal levels. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls. In power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements.

G. Capacitor:

A capacitor is a passive two-terminal electrical component used to store electrical energy temporarily in an electric field. The practical capacitors vary widely, but all contain at least two electrical conductors separated by a dielectric. The conductors can be thin films, conductive electrolyte, etc. The non conducting dielectric acts to increase the capacitor's charge capacity. A dielectric can be glass, ceramic, plastic film, air, vacuums, paper, mica, oxide layer etc. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Capacitor stores energy in the form of an electrostatic field between its plates.

H. LED:

A light-emitting diode is a two-lead semiconductor light source. It is a pn-junction diode, which emits light when activated. When suitable voltage is applied to the leads, electrons are able to recombine with electron holes within

the device; this can release energy in the form of photons. This effect is called electroluminescence.

I. Transformer:

Transformer is an electrical device that transfers energy between two or more circuits through electromagnetic. When induction varying current in the transformer's primary winding creates a varying magnetic flux in the core and a varying magnetic field on the secondary winding. This varying magnetic field at the secondary induces a varying electromotive force (EMF) or voltage in the secondary winding. According Faraday's Law in conjunction with high magnetic core properties, transformers can be designed to efficiently change AC voltages from one voltage level to another within power networks.[4]

V. SOFTWARE DESCRIPTION

A. Keil uVision4:

The Keil C51 C Compiler for the 8051 microcontroller is the most popular 8051C compiler in the world. It have more features than any other 8051 C compiler. The C51 Compiler allows you to write 8051 microcontroller applications in C. That has the efficiency and speed of assembly language extensions. The C51 Compiler give you full access to all resources of the 8051. The C51 Compiler translates C source files into reloadable object modules which contain full symbolic information for debugging with the µVision Debugger.[6]

B. Flash Magic:

This software is used to burning of program in to the microcontroller with help of controller development kit.

C. Express PCB:

This software is used to design PCB layout.

VI. RESULT

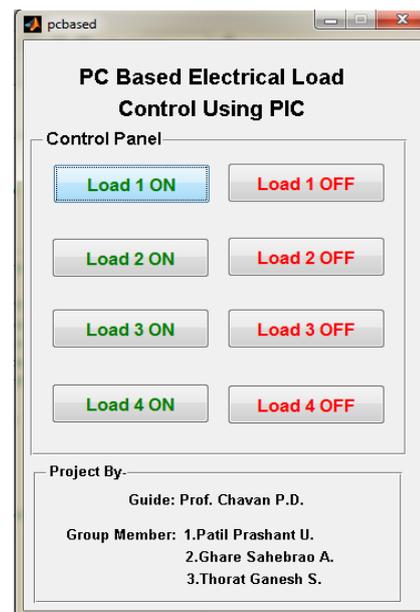


Fig. 2: GUI System to control load

This graphical user interface system is created by using matlab software. By using this system we can control ON & OFF operation of loads.

A. Load 1 Off

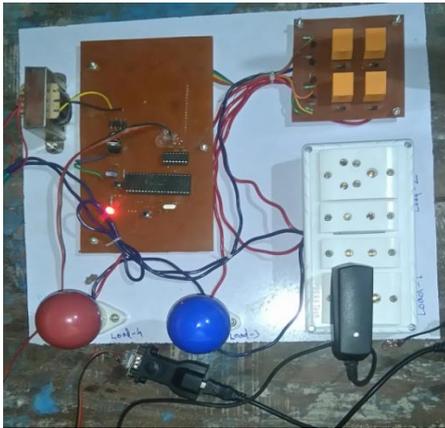


Fig. 3: Embedded system to control load

B. Load 1 On



Fig. 4: Embedded system to control load

As shown from figure, when we press the button load 1 ON on our GUI system then the connected load 1 is ON, if we press the button load 1 OFF on our GUI system then the load 1 is OFF. This process is continuing for every load which is connected in our system.

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VII. CONCLUSION

Necessity of automation is the part of our day to day life, the automated electric load which is controlled by the PC. The ability to control lighting home appliances. This proposed system is used to design and implement a control and monitor system for smart house and also used in industries to control the various loads.

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