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Automatic Power Saving Microcontroller Temperature Controller and Light Controller (APSMTL)

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ABSTRACT

Power saving device is an ideal system that not only maintains comfort but also saves your power and money supply. It also comes with an in built automatic programmer, which gives positive economic performance by saving electricity and also comes with micro controller technology in which there is no inconvenience of switching the AC 'ON' and 'OFF'. It provides built in energy saving on/off auto programmable timer from one minute to 24 hours with digital display and comes with delay timer and auto restart too.
Power saving devices are easy to install, avoids additional switching arrangement, saves electricity and reduces maintenance thus improving the life of the instrument. It is ideal for windows, split ac, package units and other such applications. Indeed, a device, which saves energy and recovers, cost in few months.

Keywords: APSMTL, PIC Controller, Microcontroller, power saving device

1. INTRODUCTION

1.1 APSMTL

The present invention relates to an automatic power- saving device which is capable of automatically interrupting the supply of electric power when electricity is not in use in wired sections between a power distributing board and receptacles or cord sections between the receptacles and electric appliances, thereby saving power at a standby state and preventing the occurrence of a fire. This project is hardware based project in which, electric power is saving through the MICROCONTROLLER. This circuit contains 2 IR Transceivers, Microcontroller, Relay driver circuit, Relay, 16*2 Model LCD screen, 0808 ADC, LDR and temperature sensor.

In this type of circuit, 2 IR sensors are connected to microcontroller which is placed near the Gate, between these two IR sensor, length us about 20-25 cm. When the person is entering then IR sensor get effected and IR sensor is get effected when any person gets exit. There are three Relays which they are connected to Microcontroller, throughout Relay driver which is capable to drive the current of relay. In this circuit Relay 1 is get connected to the main line of power supply. Relay 2 is connected to the Heater of AC. Relay 3 is connected to the porch/pole lamp. 1 ADC is connected to the Microcontroller which is given the Analog value of temperature.

We can quickly make the relay on/off using keypad for local operation. To indicate the status of relay, LED indicator is used.

1.2 Block Diagram

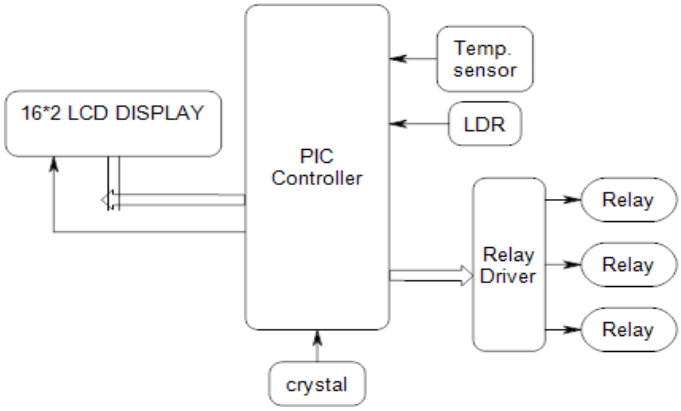

Fig-1 Block Diagram of APSMTL

1.3 Working of APSMTL

This project is hardware based project. In this project, electric power is saving through the MICROCONTROLLER and also time saving.

This circuit contains 2 IR Tran receivers, Microcontroller, Relay driver circuit, Relay, 16*2 Model LCD screen, LDR and temperature sensor.

In this type of circuit, 2 IR sensors are connected to microcontroller which is placed near the Gate, between these two IR sensor, length us about 20-25 cm. When the person is entering then IR sensor get effected and IR sensor is get effected when any person gets exit. There are three Relays which they are connected to Microcontroller, throughout Relay driver which is capable to drive the current of relay. In this circuit Relay 1 is get connected to the main line of power supply. Relay 2 is connected to the Heater of AC. Relay 3 is connected to the porch/pole lamp. 1 ADC is connected to the Microcontroller which is given the Analog value of temperature.

- We can quickly make the relay on/off using keypad for local operation
- To indicate the status of relay, there is a LED indicator

1.4 Circuit Diagram

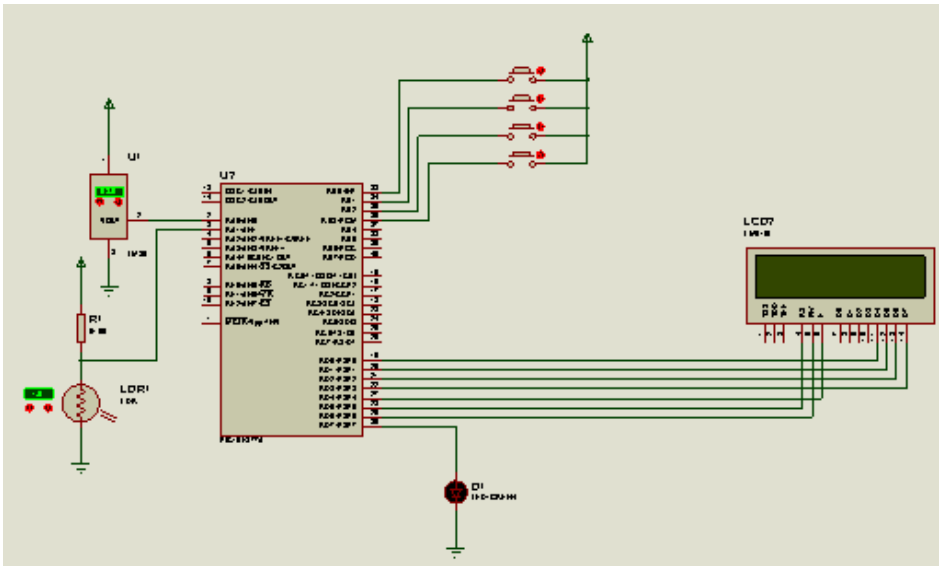

Fig-2 Circuit Diagram

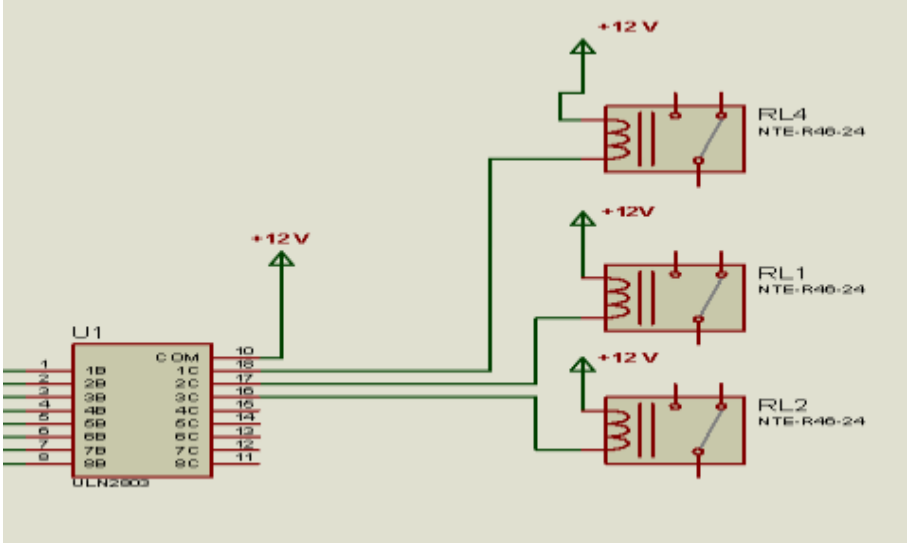

Fig-3 Circuit Diagram

2. COMPONENT REQUIRED

- 3.2768MHz Crystal (X1) 1
- 2-line 16 characters (per line) alphanumeric LCD (optional – see text) (X2) 1
- 4-way pin header, 1mm pitch (TB1) 1
- 10-way pin header and connector, 1mm pitch (TB2) 1
- 8-pin DIL socket 1
- 28-pin DIL socket 1
- Nylon self-adhesive PCB mounting pillars 4

Semi-conductors

- 1N4148 signal diodes (D1, D4) 4
- 15V 400mA Zener diodes (D2, D3) 2
- W005-type 50V 1A bridge rectifier (REC1) 1
- BC549 NPN transistor (TR1) 1
- PIC16F877A micro controller, 1
- 78L05 +5V 100mA voltage regulator (IC3) 1

Capacitors

- 10pF ceramic, 0.2in pitch (C2, C3) 2
- 100nF ceramic, 2.0in pitch (C1, C6 to C8, C11, C13) 6
- 22mF 25V radial elect. (C5, C10, C12, C14) 4
- 470mF 25V radial elect. (C4, C9) 2
- Resistors (0.25W, 1% carbon film)
- 100W (R11) 1
- 220W (R9, R10) 2
- 1kW (R1, R8) 2
- 10kW (R2 to R7, R14 to R16) 9
- 100kW (R12) 1
- 220kW (R14) 1
- 10kW min. round carbon preset potentiometers 2

2.1 Microcontroller PIC16F877A

High-Performance RISC CPU:
•Only 35 single-word instructions to learn
•All single-cycle instructions except for program branches, which are two-cycle
•Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle
• Up to 8K x 14 words of Flash Program Memory,
Up to 368 x 8 bytes of Data Memory (RAM),
Up to 256 x 8 bytes of EEPROM Data Memory
•Pinout compatible to other 28-pin or 40/44-pin

2.2 MEMORY ORGANIZATION

There are three memory blocks in each of the PIC16F87XA devices. The program memory and data memory have separate buses so that concurrent access can occur and is detailed in this section. The EEPROM data memory block is detailed in Section3.0 “Data EEPROM and Flash Program Memory”. Additional information on device memory may be found in the Pismire®

2.3 Regulator LM78L05

The LM78XX series of three terminal regulators is available with several fixed output voltages making them useful in a wide range of applications One of these is local on card regulation eliminating the distribution problems associated with single point regulation The voltages available allow these regulators to be used in logic systems instrumentation Hi-Fi and other solid state electronic equipment Although designed primarily as fixed voltage regulators these devices can be used with external components to obtain adjustable voltages and currents

2.4 Piezoelectric transducers:

A class of solid polycrystalline dielectric materials when deformed by the application of force generate electric charge and vice versa. This is known as piezoelectric effects. The charge produced due to the deformation by the application of pressure can be measured by a pair of electrodes mounted suitably. Natural crystals like quartz, Rochelle salt and synthetic materials like lithium sulphate, ammonia dihydrogen phosphate etc. exhibit the piezoelectric phenomenon.

2.5 Relay Driver Circuit

The ULN 2003 is high voltage, high current arrays each containing seven open collector pairs with common emitters each channel is rated at 200mA and can with stand peak current of 600mA. Suppression diodes are included for inductive load driving and the input are pinned apposite the outputs to simplify board layout.

3. RATING TO BE USED

3.1 Thermistor:

Oxides and Sulphate of Copper, Cobalt, Manganese etc. (range from 100 to 300-degree C)
Special thermostats made of aluminum onside covers a high temperature range from 800 to 1000-degree C

3.2 RTD (Resistance Temperature Detector):

I) Platinum (-190 to 660-degree C.)
ii) Nickel (0 to 325-degree C.)
100 Ohms platinum sensors are perhaps the most widely used RTD.

3.3 Thermocouples:

I) Copper - constantan (-180 to 370-degree C.)
ii) Iron - constantan (0 to 760-degree C.)
iii) Chromel - Alumel (0 to 1260-degree C.)

iv) Platinum - platinum (0 to 1480-degree C.)

4. APPLICATION

1. Industrial Level:
Due to this project design, owners will able to save the amount of electricity they consume.

2. Domestic Level:
This design has direct control over electricity so there is direct link between the money consumer spends and the value they get.

5. CONCLUSION

As per the system mentioned earlier the project for automatic power saving using microcontroller, Light controller, Temp controller using hardware is carried out. It is observed that the system is duly important in home application & office for measuring & controlling the various parameters to save the electricity. As our system consist of hardware. The hardware which has been used is totally reduced as per the size and complexity by using standard component. This system automatically controls the light intensity & temp. of the Room. Implementation of the system is easier & safer. It found to be reliable cost and time effective method of measuring & controlling the parameters.

6. REFERENCES

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