DESIGN SMART POWER SAVINGSYSTEM IN AUDITORIUM BY USING ATMEL AT89S52 MICROCONTROLLERS

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ABSTRACT

The main aim of this paper is to design and employ of power saving in general public places like auditoriums, shopping malls and theatres etc. Generally an Auditorium consists of so many number of electrical and electronic devices or equipments. To control and monitor all these equipments or appliances we need a person or controlling system. In this paper we are presenting the working of smart power controlling and saving in auditoriums, shopping malls, theatres etc., by using an electronic circuit in an easy way without having human being. This paper describes the complete working of electrical and electronic devices with automatic control and also power saving in theatres, shopping malls and auditoriums. To implement this we have used MCS 51 family microcontroller, IRsensors/LDR (Light Dependent Resister), 16X2 LCD (Liquid Crystal Display). MCS 51 family Microcontroller is used to control the total operation. The MCS 51 family micro - controllers are famous for these types of projects.

Keywords: Components MCS 51 Family Microcontroller (AT89S52), Ultrasonic sensors/IR sensors, LDR, LCD display, ULN driver, relay and AC/DC loads.

I. INTRODUCTION

Today power/current is a most valuable thing in the world. So we have to save the power to give for our next generation. Automatic controlling systems are preferred over manual controlling. The design of power controlling and saving project can handle controlling of electrical and electronic devices, appliances etc. Through this project we are tried to show a smart way to control the power consumption and power saving in Auditoriums, Shopping malls and Theatres etc. Now in all cities/areas we have shopping malls, theatres and auditoriums. In this monitoring and controlling the appliances becomes very typical to human being. If less number of persons enters in the auditorium then no need to switch on all the devices in that. If they on it is waste of power. If maximum persons are in that we need to ON all the devices without fail. This is too hard to maintain properly and manually. If suddenly any problem arise, it is very difficult to find out. To overcome these types of problems we are developed a system that can maintain all these ricks. This paper covers the features of capacity of monitor, hardware description, the use of different types of sensors.

II PRINCIPLE

The PIR Sensor senses the motion of a human body by the change in surrounding ambient temperature. Then it turns on the load to which it is connected. The load remains on until it senses motion. The load may be any form of device, i.e. lamp, fan, alarm, etc. Once the motion is seized, it switches off the load.

2.1 Proposed Model

The operation of the experimental kit changes according to the position of the switch. Let us suppose that the kit is placed at the desired location. The basic operation of kit would be that when a person enters in that area the PIR sensor absorbs the black body radiation emitted by that person and activates. Depending upon the switch position the operation will change.

1. When switch is at position 1, it acts as a security surveillance system and it turns the alarm ON. When the alarm is generated, a message is sent to the nearby station indicating that someone just entered. When the person leaves, the PIR sensor will activate the alarm again.
2. When switch is at position 2, it acts as a power saving device and the lamp and fan turns ON. When the person leaves the place, the PIR sensor will activate again and the lamp and fan turns OFF.

2.2 Functional Block Diagram

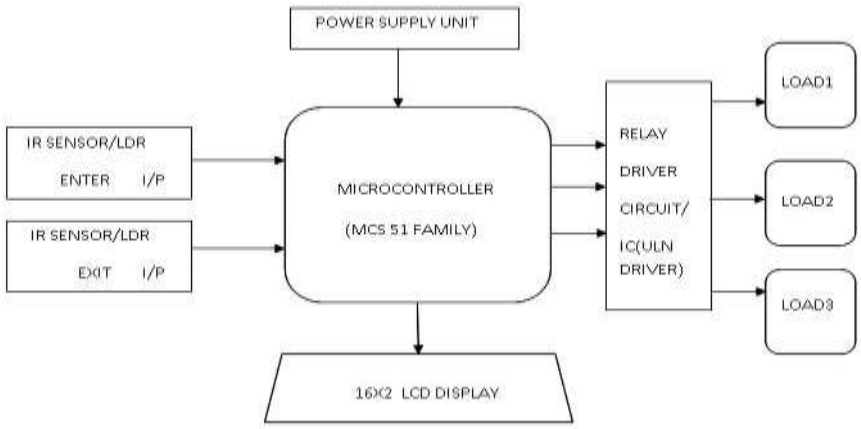


Fig 1

- Power supply unit
- IR/LDR sensors (enter exit)
- Microcontroller Unit
- Relay driver circuit/2ULN driver
- LCD
- Loads

This paper is microcontroller. It is the bedrock of the system. The microcontroller a different type of integrated circuit is a complete computer on a chip, containing all the elements of the basic microprocessor along with other specialized functions like serial communication, interrupts, timing circuit ROM (data memory), RAM (program memory). Basically a microcontroller is a computing device, and is a single integrated circuit ("silicon chip" or IC) used to form part of a product that incorporates some software program control. As a microcontroller is basically part of a computing system it can be used in applications requiring control, operator and user display generation, simple sequencing and many other mundane tasks.

1) Power Supply

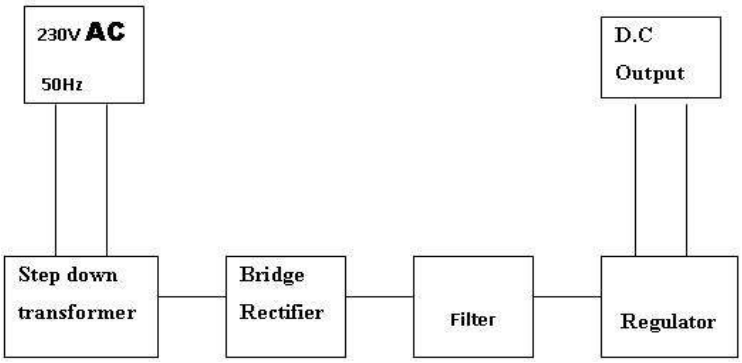


Fig1.1

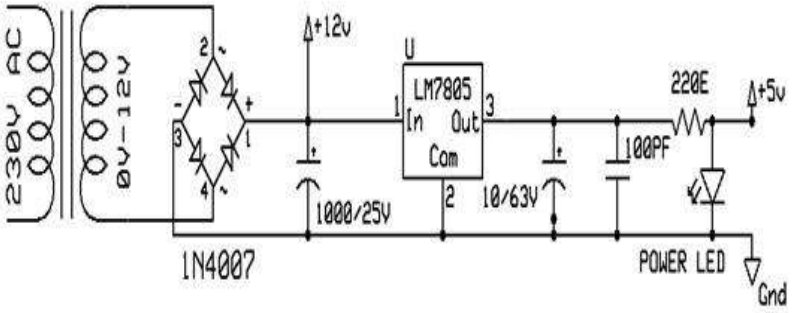


Fig1.2

In this circuit we have used a step down transformer which can convert from 240V to 12V ac-ac.the output of this is connected to full wave/bridge rectifier (four 1N4007diodes) which converts form ac voltage to dc voltage with ripples (ac component). Further it is connected to capacitor acts as filter to filter the ripples. And here we connected avoltage regulator 12-5v LM7805, then it is applied to capacitor and then LED to indicate the power.

2) IR sensor LED/LDR

An infrared sensor LED is an electronic device that emits or detects infrared radiation to sense aspects of its surroundings.TSAL6200 is a high efficiency infrared emitting diode in GaAlAs on GaAs technology, molded in

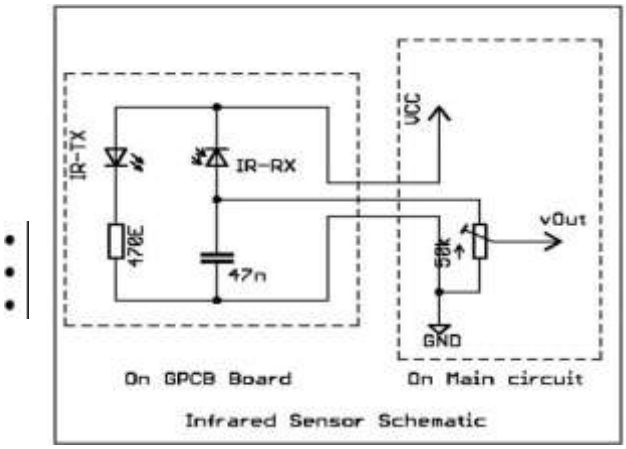
clear, bluegrey tinted plastic packages.In comparison with the standard GaAs on GaAs technology these emitters achieve more than 100 % radiant power improvement at a similar wavelength. The forward voltages at low current and at high pulse current roughly correspond to the low values of the standard technology.Therefore these emitters are ideally suitable as high performance replacements of standard emitters. The features and operation circuit of IR – TX and IR – RX is shown if fig.4

Extra high radiant power and radiant intensity High reliability

- Low forward voltage

Peak wavelength λp = 940 nm

Instead of IR sensor we can use LDR as a sensor. LDR[1]s or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms,but when they are illuminated with light resistance drops dramatically.



3) Microcontroller

The Intel MCS-51 generally called as 8051 is Harvard architecture, single chip microcontroller which was developed by Intel in 1980. Intel"s original MCS-51 family was developed by usingNMOStechnology, but later versions were CMOS technology. CMOS chips consume less power than NMOS chip

The important features of MCS-51 family microcontrollers:

1. Central Processing Unit
2. Random Access Memory
3. TRead Only Memory

III ATMEL MICROCONTROLLER: AT89S52

The AT89S52 is a 40 pin, 24MHz, low-power, high-performance CMOS 8-bit micro-controller.

3.1 Features

• Compatible with MCS®-51 Products

• 8K Bytes of In-System Programmable (ISP)

• 4.0V to 5.5V Operating Range

• Fully Static Operation: 0 Hz to 33 MHz

• Three-level Program Memory Lock

• Low-power Idle and

3.2 Pin description of AT89S52

VCC: Supply
GND: ground
Port 0: Port 0 is an 8-bit open drain bidirectional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used ashigh-impedance inputs. Port 0 can also be configured to be the multiplexed low-order address/data bus during accesses to external program and data memory. In this mode, P0 has internal pull-ups.Port 1: Port 1 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. In addition, P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2) and the timer/counter 2 trigger input (P1.1/T2EX), respectively, as shown in the following table. Port 2: Port 2 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 2 output buffers can sink/source four TTL inputs. Port 3: Port 3 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 3 output buffers can sink/source four TTL inputs.

Port Pin	Alternate Functions
P3.0	RXD (serial input port)
P3.1	TXD (serial output port)
P3.2	$\overline{INT0}$ (external interrupt 0)
P3.3	$\overline{INT1}$ (external interrupt 1)
P3.4	T0 (timer 0 external input)
P3.5	T1 (timer 1 external input)
P3.6	$\overline{WR}$ (external data memory write strobe)
P3.7	$\overline{RD}$ (external data memory read strobe)

Table3.1

ALE/PROG: Address Latch Enable RST: Reset pin
PSEN: Program Store Enable EA/VPP: External Access Enable
XTAL1: Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL 2: Output from the inverting oscillator amplifier.

3.3 Memory organization

MCS-51 devices have a separate address space for Program and Data Memory. Up to 64K bytes each of external Program and Data Memory can be addressed.

Program Memory: If the EA pin is connected to GND, all program fetches are directed to external memory. On the AT89S52, if EA is connected to VCC, program fetches to addresses 0000H through 1FFFH are directed to internal memory and fetches to addresses 2000H through FFFFH are to external memory.

Data Memory: The AT89S52 implements 256 bytes of on-chip RAM. The upper 128 bytes occupy a parallel address space to the Special Function Registers. This means that the upper 128 bytes have the same addresses as the SFR space but are physically separate from SFR space. Instructions that use indirect addressing access the upper 128 bytes of RAM. For example, the following indirect addressing instruction, where R0 contains 0A0H, accesses the

3.4 Circuit diagram

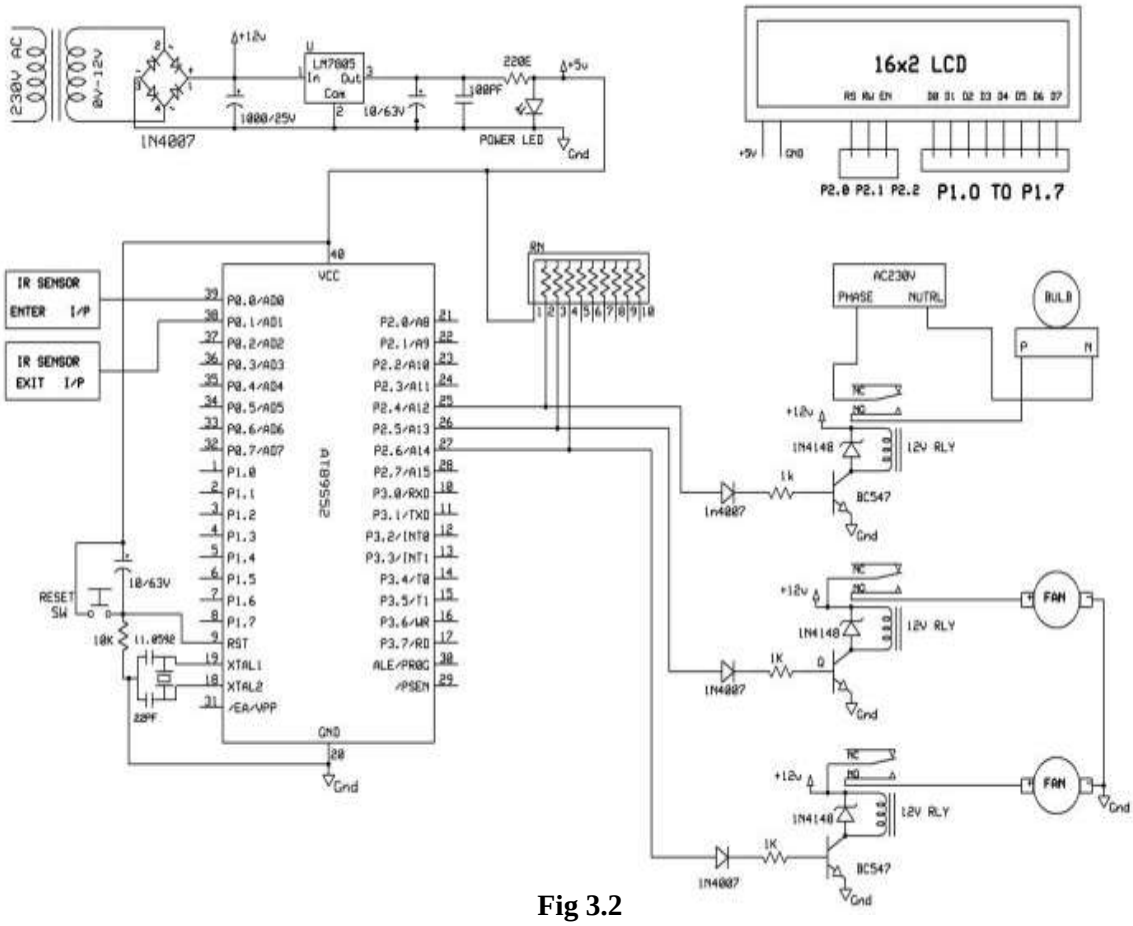


Fig 3.2

3.5 Circuit Operation

The two IR sensors/LDRs are directly connected to the microcontroller pin P0.0 and P0.1. The output of the two sensors are applied as a high pulse and low pulse. These high and low pulses are considered as „set – 1" and „reset – 0 ". And this conditions are checked by the microcontroller as per the written code/dumped code in it. The code/program is written in assembly language. The

"ENTRENCE" IR sensor reads/counts the no. of persons enters into the auditorium/shopping mall/theatre. Then lights, fans, other electronic and electrical appliances are switched ON automatically, as per the count given in the program/code. In this project we illustrated the concept with one „ac" bulb and two „dc" fans. If less no. of persons are enters in auditorium, only one device should goes ON. If the no. of persons are entering into auditorium is increased then automatically the remaining all devices goesON. In the same way the "EXIT" IR sensor sense/counts the no. of persons leaving from the auditorium. If one by one leaves from auditorium then automatically the devices (fan, light.etc.) in that goes OFF one by one.

If no person in auditorium then all the devices should becomes OFF. This is done by microcontroller switching without having any human interference. So using this electronic circuit we can reduce 99% human efforts in controlling the all appliances in auditorium. While doing this operation the circuit is able to display the no. of persons in auditorium on the 16x2 LCD display. If the auditorium does not have any person then it displays "AUDITORIUM empty". If any person enter in to auditorium it is sensed by "ENTRENCE IR Sensor" and displays the no. of persons are in auditorium. If the auditorium is full then LCD display shows the message"AUDITORIUM full". So by implementing this concept we can control the wastage of the power in such type of areas.

3.6 Driver

L293D Drivers are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. These designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. These drivers Control the two dc motors

3.7 Relay

A relay is an electrically operated switch. To control a circuit by a low-power signal, relays are used. We are using two relays, one for switching the lamp and one, and the other for switching the alarm system.

Fig. 5.1: SPDT sealed COM-00100 Relay.

The relay used here is SPDT Sealed COM-00100.This is a high quality Single Pole - Double Throw (SPDT) sealed relays. These are used to switch high current, and/or high voltage devices. This relay coil is rated up to 12V having a minimum switching voltage of 5V. The contacts are rated up to 5A (@250VAC, 30VDC).

3.8 Load Appliances

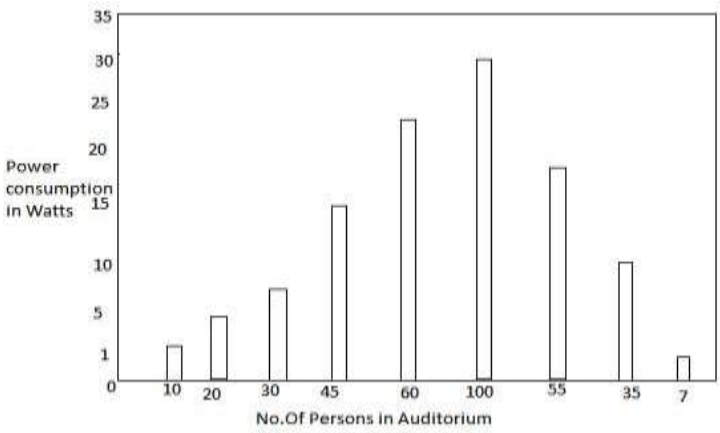
The different types of loads being used are:

- Fan and Light of any type
- Camera for surveillance
- Alarm or Buzzer
- Basic mobile phone for intimation

Fig 6.1.: LoadAppliance

IV OBSERVATIONS

The concept of power saving through this paper will help us to implement real time applications and industrial. We implemented and observed the results of this project for 120 people capable room, and consume maximum 35 Watt power.



4.1 Advantages

- They detect infrared light from a large distance, depending on how the PIR sensor is calibrated.
- PIR sensors are generally compact and can be fitted into virtually any electronic device.
- They are low cost and low power devices, have a wide lens range, , pretty rugged and can be easily interfaced with other devices
- The same device can be used for two different purposes, thus providing multi-functionality features.

4.2 Applications

- Common restroom, for lights & exhaust fans
- Common staircases
- In parking area
- For garden lights

V CONCLUSION

In this experimental setup, we are able to turn automatically the appliances ON and OFF as required and security alarm. By implementing this setup, we can expect more power conservation and high security. This concept not only ensures that our work will be useful in the future but it will also provide flexibility to adapt and extend as needs change. This device is compatible with our existing system used for providing comfort.

In this paper we have developed a real time model that can control and monitor the complete status of all appliances of any place like auditorium, shopping mall, theatre, school, college, bus stand etc automatically without having human interference. So that there is a chance to reduce the power wastage and human efforts. An automated auditorium can be a very simple grouping of controls, or it can be heavily automated where any appliance that is plugged in to electrical power supply is remotely controlled. It monitors the entrance and exit s of the auditorium so that we need not to check manually. This system has a lot of advantages such as simple structure, small size, low power consumption, low cost and stable

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