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RESEARCH ARTICLE

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OPTIMUM ENERGY MANAGEMENT AND CONTROL SYSTEM

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ABSTRACT

The study depends on microcontroller which controls the all uses of load which controls the light and also it include the no of individual the room precisely. Counters with directional identification are helpful for counting of items moving along a predefined way. These may discover application as guest counters furthermore to count of articles in a provided guidance and disregarding those moving in the invert bearing. Here we introduce a straightforward circuit that the tallies the quantity of people or the articles entering the premises not disregarding those leaving it. The point of this study is to check the people going into and leaving the room furthermore switch the room light as needs be. On the off chance that we consider an office or a meeting corridor or whatever other room, we have to turn on the lights at whatever point anyone goes into the room. This is true even in the day time at some places like conference halls or offices where a good brightness levels are desired. Also, the lights should be turned off by the last person leaving the room. The problem is, when the first person is entering a room, he should search for switch board and then for the right set of switches among hundreds of switches corresponding to lights fans etc. of the conference hall. This is a daunting task. While leaving the lobby, we can't ensure that the last individual turns off the lights. Regardless of the possibility that he endeavours to do it, he again confronts the issue the primary individual had confronted. We ought not anticipate that them will do that work experiencing the exchanging rigmaroles. To stay away from this issue we have made a circuit which automatically switches ON/OFF the room light depending on the number of people in the room. This circuit keep track of number of visitors. If the number of visitor is greater than zero, then it turns ON all the lights. Else, it turns OFF all the lights automatically. It does not require any manual intervention.

Key words: Optimum, Energy , Management , Control System, Counter.

INTRODUCTION[1, 2]

The study is intended to screen the quantity of people entering and also leaving a room. Electrical burdens are switched ON as the primary individual enters and switches OFF when the last individual clears out. IR sensors utilized as a part of blend with microcontroller to screen every one of the operations. This helps in saving lot of energy. There are two sets sensors, each kept at certain separation from the other. One sets of sensor comprises of a transmitter and a receiver, kept precisely inverse to each other. The transmitting part discharges regulated IR light which is fed at the recipient end and nourished to a microcontroller of 8051 family. When a person enters the room then microcontroller senses it (with the help of IR sensors) and increments the count and displays it on 7 segment displays and also switches ON the load. Similarly when a man leaves the room, the count gets decremented. At the point when the last individual ways out from the room, the light is switched OFF. The load operation is handled by a relay interfaced to the microcontroller. Advance the study can be upgraded by using timer arrangement in the study so that if the load switching doesn't take place for some reason as desired, then timer would complete the task after prefixed time.

Advantages[3]

- Highly sensitive
- Low cost and reliable circuit
- Directional counting
- Energy saving, Energy saver
- We can send this data to a remote location using mobile or internet
- Voice alarm system can be added to indicate that room is full & persons cannot enter inside.
- This helps in energy conservation.

Disadvantage[3]

- Higher cost than beam systems.
- May require repeat visits for calibration.
- Lower lifetime and higher power consumption than thermal systems.
- Many systems require PCs are not fully embedded.
- Less simple implementation than beam systems.
- Accuracy can be affected by differing light levels.

BLOCK DIAGRAM OF AUTOMATIC ROOM CONTROLER

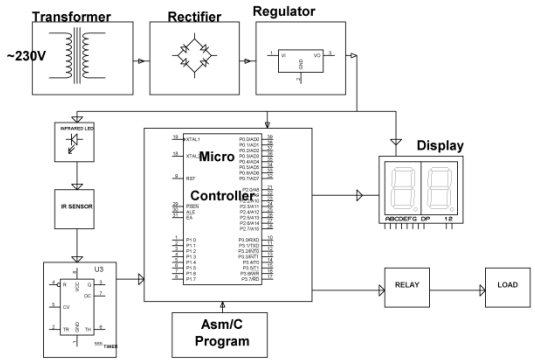

Figure 1 Block Diagram of Automatic Room Controler

DISCRIPTION OF BLOCK DIAGRAM

The block diagram describe that when the any individual enters from the transmitter and receiver sensor mounted in the circuit that sensor is called infrared sensor. Which sensor the human body perfectly and precisely. The sensor the human body the signal go to the input port of microcontroller which get interface and when the through instruction and the controller will attach to the circuit which sense the number of human body get counted by the counter and it also get display on the led screen. The controlled output ports of the microcontroller which connect to the relay which gives the output to power to the application.

CIRCUIT DIAGRAM OF AUTOMATIC ROOM CONTROLLER

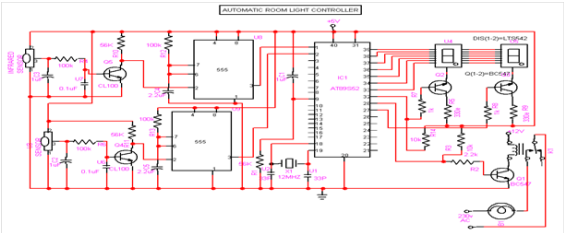

Figure 2 Circuit Diagram

CIRCUIT DIAGRAM DISCRIPTION

There are two sets sensors, each kept at certain separation from the other one sets of collector, kept precisely inverse to each other. The transmitting part emanates balanced IR light which is gotten at the recipient end and sustained to a microcontroller of 8051family. When a person

enters the room then microcontroller senses it (with the help of IR sensors) and increments the count and display it on 7 segment displays and switches ON the lode. In the same way when a person exits the room, the count gets decremented. When the last individual exits from the room the lamp is switched OFF. The lode operation is handled by a relay interfaced to the microcontroller.

Table 1 List of Component & Software

NO OF COMPONENT	NAME OF COMPONENT	VALUE OF COMPONENT
2	Infrared Sensor	-
5	Capacitors	1 F
2	Capacitors	0.01 F
4	Resistor	100 K
3	Resistor	56 K
2	Resistor	10 K
1	Resistor	2.2 K
2	Resistor	1 K
2	Resistor	330 E
3	Transistor NPN	BC547
2	Transistor NPN	CL100
2	Time IC	555
1	Microcontroller IC	AT89C51
1	Crystal Oscillator	12MHZ
1	LCD Display	LTS542

ACTUAL DIAGRAM

Figure 3 Actual circuit diagram in off condition

Figure 4 actual circuit diagram in on condition

DISCRIPTION OF COMPONENT

AT89S51 Microcontroller

In this project of Electronic Voting Machine we use the AT89S51 Microcontroller Which is 8-Bit Microcontroller with 8K Bytes in-System Programmable Flash. The Details of this microcontroller are explained below.

FEATURES

- Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog TimerDual Data Pointe
- Compatible with MCS-51 Products.
- 8K Bytes of In-System Programmable (ISP) Flash Memory – Endurance: 1000 Write/Erase Cycles.
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and
- Power-off Flag

DESCRIPTION OF AT89C51

The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control Application. The AT89S51 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The

Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

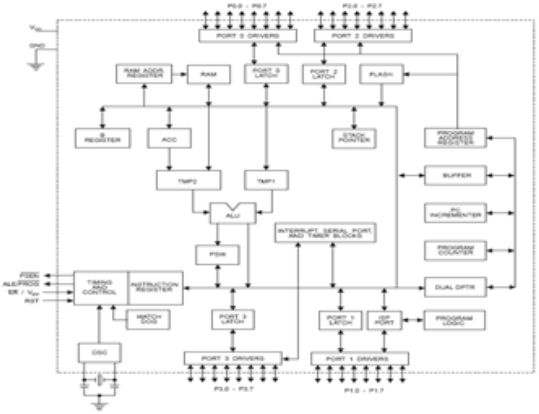

Figure 5 Block diagram of AT89C51

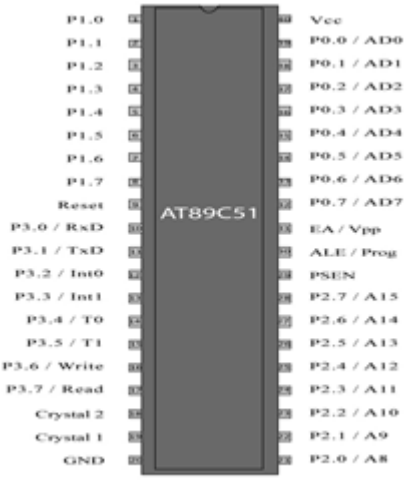

Figure 6 PIN DIAGRAM of 89C51

PIN DISCRIPTION

VCC : Supply voltage (+5V DC).

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 as high 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).

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. When 1s are written to Port 2 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that uses 16-bit addresses (MOVX @ DPTR).

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. When 1s are written to Port 3 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the pull-ups. Port 3 also receives some control signals for Flash programming and verification.

RST: Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device. This pin drives High for 96 oscillator periods after the Watchdog times out.

ALE/PROG: Address latch enable (ALE) is an output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (PROG) during Flash programming. In normal operation, ALE is emitted at a constant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external data memory. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

PSEN: Program Store Enable (PSEN) is the read strobe to external program memory. When the

AT89S52 is executing code from external program memory, PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory.

EA/VPP: EA (External Access Enable) must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions. This pin also receives the 12-volt programming enable voltage (VPP) during Flash programming.

XTAL1: Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2: Output from the inverting oscillator amplifier.

Special Function Register: A map of the on-chip memory area called the Special Function Register (SFR). Read accesses to these addresses will in general return random data, and write accesses will have an indeterminate effect.

Timer 2 Registers: Control and status bits are contained in registers T2CON and T2MOD for Timer 2. The register pair are the Capture/Reload registers for Timer 2 in 16-bit capture mode or 16-bit auto-reload mode.

Interrupt Registers: The individual interrupt enable bits are in the IE register. Two priorities can be set for each of the six interrupt sources in the IP register.

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 AT89S51, 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 AT89S51 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. When an instruction accesses an internal location above address 7FH, the address mode used in the instruction specifies whether the CPU accesses the upper 128 bytes of RAM or the SFR space. Instructions which use direct addressing access of the SFR space. Instructions that use indirect addressing access the upper 128 bytes of RAM.

Interfacing LCD Display in 8bit Mode

Now let us come to the interfacing side of LCD. Let us see the 8bit mode interfacing of the LCD display with an AVR micro controller first. I have added two. Here to interface LCD with Aver, an 8 bit data bus is required. In addition we need 2 bit control bus for write only mode or 3 bit control bus circuits in this post **1)Interfacing LCD with Avr Atmega8** and **2)Interfacing with Atmega32.**for Read plus write mode. Connect pin 1 of the LCD module to ground, pin 2 to + ve supply. Connect a Pot (2 to 5 K Ohm) across the supply and ground. next Connect the middle pin of the pot to pin3 of LCD module. If you want to light up the back light, conge –LED pin to ground. Connect the +LED pin of the LCD to the +ve supply using a resistor. Figure below is the two circuit diagrams.

Interfacing LCD with Atmega8 (in 8bit mode)-Circuit Diagram

There are two routines for two separate cycles. One is used to transfer data (or character). Another sends command. In **C** code, they are listed under the functions **'LCD'** and **'LCD cmd'** respectively. To prevent crash of data, we must allow the LCD to complete execution of each operation. Here we will be using delay loops available from the AVR studio Library. Each instruction or data takes at least **40uS to get executed**. Longest wait loop is of **1.65mS**. For further details, read (Wait a minute. It shouldn't be 'LCD display', instead 'LC display'. But 'LCD display' is widely used) & for beginners.

Infrared Sensors

Principle IR LED emits infrared radiation. This radiation illuminates the surface in front of LED. Surface reflects the infrared light. Depending on reflectivity of the surface, amount of light reflected varies. This reflected light is made incident on reverse biased IR sensor. When photons

are incident on reverse biased junction of this diode, electron-hole pairs are generated, which results in reverse leakage current. Amount of electron-hole pairs generated depends on intensity of incident IR radiation. More intense radiation results in more reverse leakage current. This current can be passed through a resistor so as to get proportional voltage. Thus as intensity of incident rays varies, voltage across resistor will vary accordingly. This voltage can then be given to OPAMP based comparator. Output of the comparator can be read by uC. Alternatively, you can use on-chip ADC in AVR microcontroller to measure this voltage and perform comparison in software.

IR LED and IR Sensor

IR LED is used as a source of infrared rays. It comes in two packages 3mm or 5mm. 3mm is better as it is requires less space. IR sensor is nothing but a diode, which is sensitive for infrared radiation. This infrared transmitter and receiver is called as IR TX-RX pair. It can be obtained from any decent electronics component shop and costs less than 10Rs. Following snap shows 3mm and 5mm IR pairs. Color of IR transmitter and receiver is Different. However you may come across pairs which appear exactly same or even has opposite colors than shown in above image and it is not possible to distinguish between TX and RX visually. In case you will have to take help of multimeter to distinguish between them Here is how you can distinguish between IR TX-RX using DMM Connect cathode of one LED to +ve terminal of DMM Connect anode of the same LED to common terminal of DMM (means connect LED such that It gets reverse biased by DMM) Set DMM to measure resistance up to 2M Ohm. Check the reading. Repeat above procedure with second LED. In above process, when you get the reading of the few hundred Kilo Ohms on DMM, then it indicated that LED that you are testing is IR sensor. In case of IR transmitter DMM will not show any reading. Following snap shows typical DMM reading obtained when IR receiver is connected to it as mentioned above. Second snap shows how sensor's resistance increases when it is covered by a finger. Note that, these are just illustrative figures and they will depend upon sensor as well as DMM that you are using. While buying an IR sensor, make sure that its reverse resistance in ambient light is below 1000K. If it is more than this value, then it will not be able to generate sufficient voltage across external resistor and hence will be less sensitive to small variation in incident light.

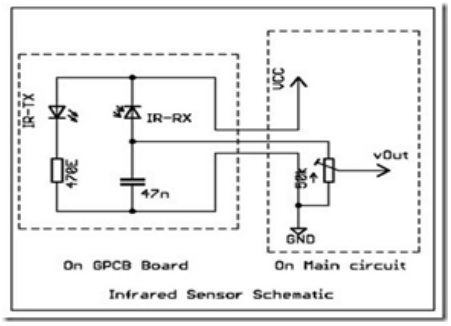

Figure 7 The circuit Diagram of IR

The circuit Diagram of IR sensor

Circuit diagram for IR sensor module is very simple and straight forward. Circuit is divided into two sections. IR TX and IR RX are to be soldered on small general purpose Grid PCB. From this module, take out 3 wires of sufficiently long length (say 1 ft). Then, as shown above, connect them to VCC, preset and to ground on main board. By adjusting preset, you can adjust sensitivity of the sensor. VCC should be connected to 5V supply.

Timer IC 555

555 is a very commonly used IC for generating accurate timing pulses. It is an 8pin timer IC and has mainly two modes of operation: monostable and actable. In monostable mode time delay of the pulses can be precisely controlled by an external resistor and a capacitor whereas in actablemode the frequency & duty cycle are controlled by two external resistors and a capacitor. 555 is very commonly used for generating time delays and pulses.

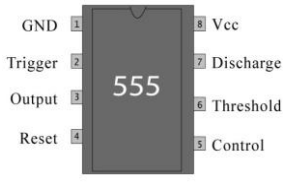

Figure 8 Pin Diagram of Timer IC 555

APPLICATION

- Museums
- Shopping malls

- Cinema theater
- Conference room, study rooms in colleges
- Visitor counting
- Can be used in various rooms like seminar hall, where the capacity room is limited and should not be exceeded. Project will display the actual number of persons inside the room.

Table 2 Pin Description Block Diagram

PIN NO	FUNCTION	NAME
1	Ground (0V)	Ground
2	Voltage below 1/3Vcc to trigger the pulse	Trigger
3	Pulsating output	Output
4	Active low; interrupts the timing interval at Output	Reset
5	Provides access to the internal voltage divider; default 2/3 Vcc	Control Voltage
6	The pulse ends when the voltage is greater than Control	Threshold
7	Open collector output; to discharge the capacitor	Discharge
8	Supply voltage; 5V (4.5V - 16 V)	Vcc

FUTURE SCOPE

This study can be helpful in development of smart cities. Also, by modifying this circuit and using two relays we can achieve a task of opening and closing the door.

CONCLUSION

By this study we have successfully tried to develop a circuit which automatically switches ON/OFF the room light depending on the number of people in the room. This circuit keep track of number of visitors. If the number of visitor is greater than zero, then it turns ON all the lights. Else, it turns OFF all the lights automatically. It does not require any manual intervention.

REFERANCE

[1]. Alheraish A. Design and implementation of home automation system. IEEE Transactions on Consumer Electronics. 2004;50(4):1087-92.

[2]. Hart EF. Remote control for combined ceiling fan and light fixture. Google Patents; 1988.

[3]. Nunes RJ, Delgado JC, editors. An Internet application for home automation. Electrotechnical Conference, 2000 MELECON 2000 10th Mediterranean; 2000: IEEE.