Electricity Saving Using Embedded System

Under the Supervision of

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An Introduction

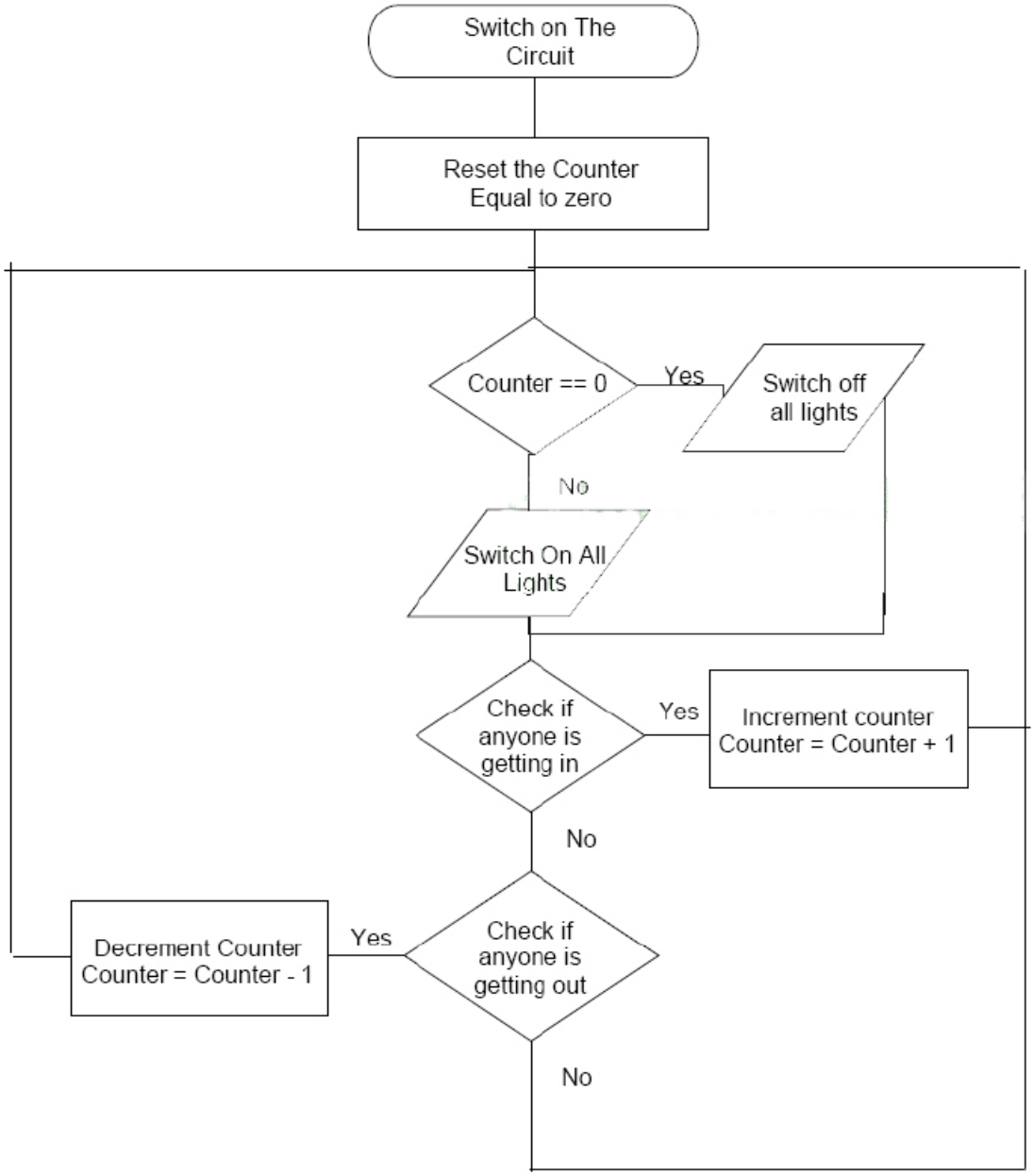
The aim of our project is to save Electricity. We could save electricity in our workplace and home by switching off unnecessary lights and fans . But this is the age of automation and electronic control. So we decided to make such a system that could keep a watch on the number of persons getting in a room and getting out of the room. By keeping a count of the peoples the circuit could take the decision whether the room lights should be ON or OFF.

We could have used digital components like counter ICs and Gates to implement this logic but we preferred to make it cheap and economical such that it could be mass produced. We used the 8051 Microcontroller for our project from Atmel (AT89C51).

Thus we were able to find a better replacement for the space cosuming and costly ICs. Moreover it was flexible and easy to change the circuit behavior by simply changing the program burnt on the flash memory chip of the Microcontroller.

In our further discussion we would come to see the details of the circuit and the program flowchart and source code.

Flow chart


Switch on The Circuit
Reset the Counter Equal to zero
Counter == 0
Yes
Switch off all lights
No
Switch On All Lights
Check if anyone is getting in
Yes
Increment counter Counter = Counter + 1
No
Check if anyone is getting out
Yes
Decrement Counter Counter = Counter - 1
No

Working Principle

The Logic shown in the flow chart was implemented by a program written in assembly language called door.asm and was compiled to produce the door.hex code that was finally burnt on the Microcontroller chip. Program was written in assembly language and compiled to obtain the hex code that was finally burnt on the Microcontroller chip using a universal chip burner. The detailed source code and the hex code is given below.

When the circuit is switched on, a internal counter is set to zero . The sensors keep looking for persons getting in and out and accordingly pass a signal to the Microcontroller which then keep count of the persons and after some calculations take the decision whether the lights and fans should be ON or OFF.

The sensors used in the circuit are simple push to on switches which can be replaced by LDR (Light Dependent Resistance). The LDR have the property that when light falls on it its resistance drops down and in darkness the resistance increases. This propery of the LDR is used in sensing the number of persons going inside the room and going outside the room. Use of Infrared sensor can also be implemented for the same reason

Moreover this could be integrated with RFID (Radio Frequency Identification) to keep count of people getting inside and outside of a room.

**********DOOR.ASM**********

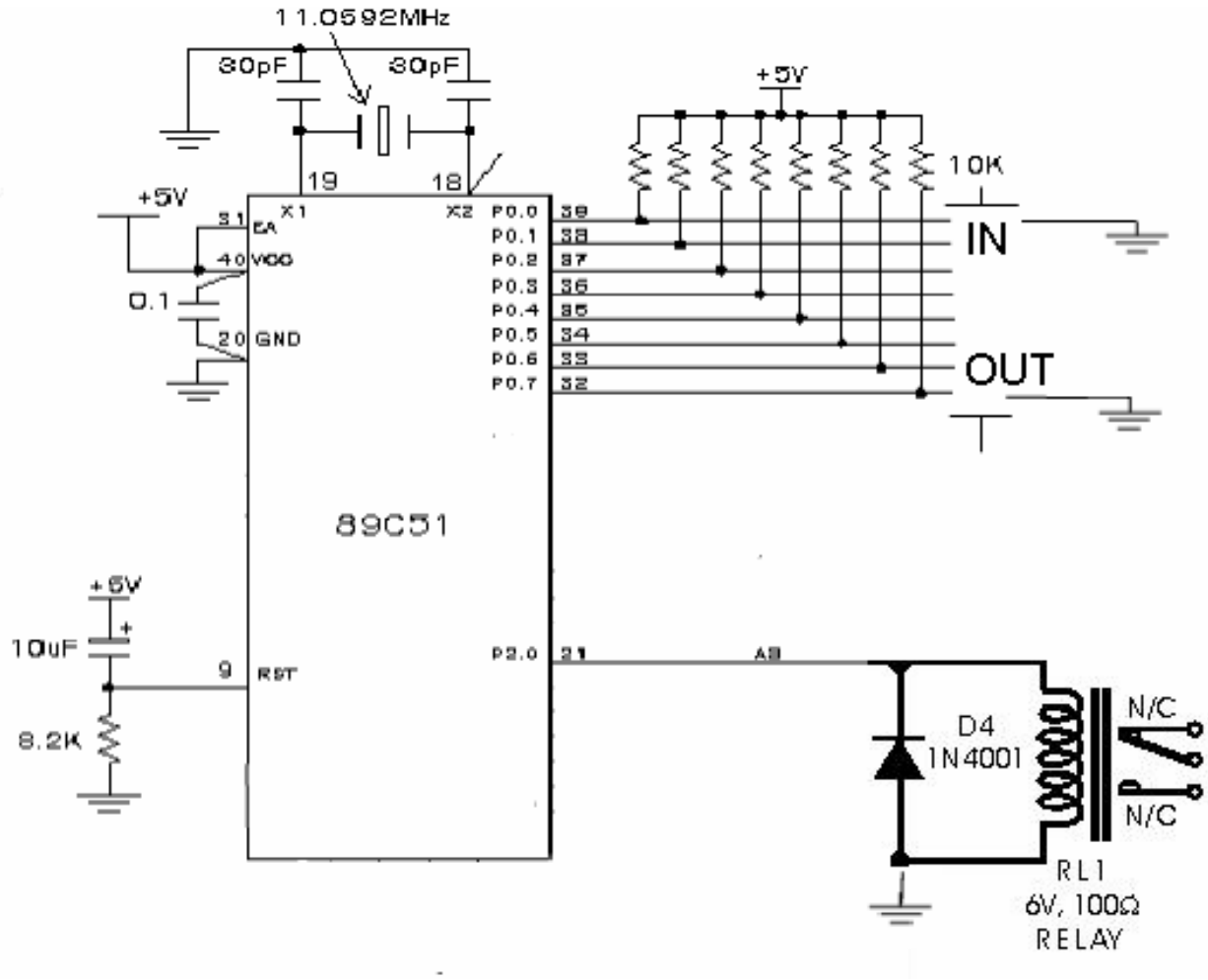
```
        ORG 0000H
        MOV R0, #00H
        MOV P2, #FFH
HERE:   CLR C
        MOV A,P0
        ACALL DELAY
        RRC A
        JNC IN
BACK:   RLC A
        RLC A
        JNC CHK
        SJMP HERE
IN:     INC R0
        CJNE R0,#00H,SEND
        SJMP BACK
SEND:   SJMP OUTPUT
CHK:    CJNE R0, #00H,OUT
        SJMP HERE
OUT:    DEC R0
OUTPUT: MOV A,R0
        JZ OFF
        SETB P2.0
        SJMP HERE
OFF:    CLR P2.0
        SJMP HERE
DELAY:  MOV R1, #FFH
BACK3:  MOV R2,#7FH
BACK4:  DJNZ R2, BACK4
        DJNZ R1, BACK3
        RET
```

The Compiled Hex code that is finally burnt on the chip is given below:

**********DOOR.HEX**********

```
:10000000758966758D00758C00D2B5D2B4F590E512
:0A0010008AA88BD8001480FB80EF53
:00000001FF
```

Circuit Diagram



Conclusion

The Project finds application in schools and offices and industries where a lot of energy wastage takes place. More over the efficiency of the circuit can be increased by providing a back up mechanism such that when no transition takes place within a duration of an hour or so the lights will be switched off automatically.

This input to the microcontroller is very flexible . It can take input from a number of devices, ranging from simple switches to Light Dependent resistance and Infrared devices , there is a minor change in the source code to be performed in case we find a better sensor. Also the time required to develop the project becomes less. Because not much is to be done with the hardware . Moreover the output can be also very flexibly taken out to a relay circuit or can be fed directly to a computer through serial or parallel ports.

Mass production of the unit is very cheap. And needs no costly assembly lines or highly trained professionals. Even the components used are very cheap and less power consuming. Troubleshooting is very easy and can even be even automated.