International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 2 Issue 3, March - 2013

GSM Based ClassRoom Power Control

[1]B.ChandraMohan, [2]Krishna Kanth.Y, [3]G,Mahendra Babu, [4]K.Mahesh Babu

[1]Head of the Department of ECE, Bapatla Engineering College, Bapatla-522101, India,
[2]Final Year, Department of ECE, Bapatla Engineering College, Bapatla-522101, India,
[3]Final Year, Department of ECE, Bapatla Engineering College, Bapatla-522101, India,
[4]Final Year, Department of ECE, Bapatla Engineering College, Bapatla-522101, India,

Abstract: ***This paper defines a scheme for control of power in a class room thereby saving electricity which is a major concern today. It also describes the use of wireless sensor networks using GSM for class room power monitoring and control. This system would provide a remote access for class room power control and maintenance. Power saving is an important issue when there is a severe power cut. If the appliances are switched off when not in use, power can be saved. In this work, a GSM based class room power control scheme is employed. The microcontroller used in the proposed scheme is AT89S52. The proposed system is highly secure, since unauthorized users are not permitted to access the power control.***

Index terms: GSM , AT89S52 MICRO CONTROLLER.

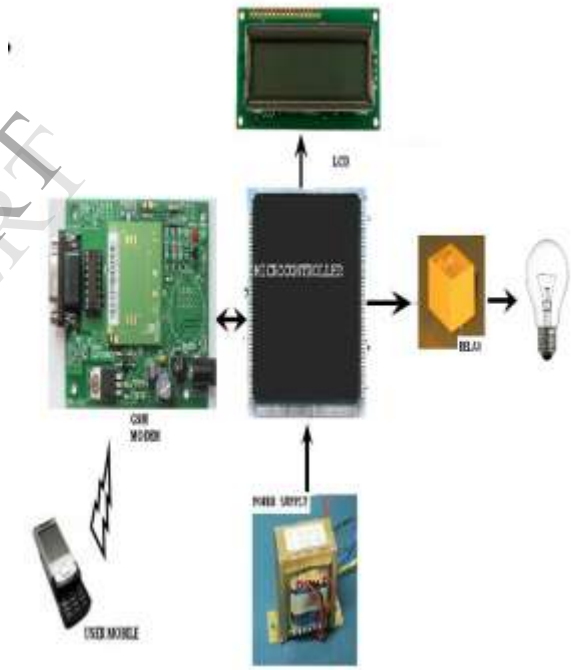
1. INTRODUCTION

Embedded systems are designed using microcontrollers and microprocessors. A microprocessor is a general purpose IC like 8085,8086,80386 and the Pentium. These microprocessors do not contain any RAM, ROM, I/O ports. For this reason these are called general purpose microprocessors. A system designer using microprocessor must add external ROM, RAM, I/O ports to make his system functional. As a result the system becomes much bulkier and much more expensive, yet they have the advantage of versatility such that designer can decide on the amount of RAM, ROM, and I/O ports needed to fit the task.

This is not the case with microcontroller, which has a CPU(a microprocessor) in addition to fixed amount of RAM,ROM,I/O ports and timers on a single chip. We can rightly say that the processor, RAM, ROM,I/O ports and timers are embedded together on one chip. Therefore designer cannot add any external memory, I/O ports or timers to. Microcontroller and microprocessor are used in embedded systems products. An embedded system uses a microprocessor or a microcontroller to do one and one function only. A printer is an example of an embedded system since it performs single task, namely, getting the data and printing it. Contrast to this, a Pentium based PC performs many tasks which includes word processor, print server, bank terminal, video game player, network server, or internet terminal. In an embedded system, there is only one application software that is typically burned into ROM. But, in a general purpose system there are many application softwares, one for each function.

.

2. SYSTEM ARCHITECTURE



"Figure 1. Block diagram"

.

The system comprises six devices: a AT89S52microcontroller,GSM,LCDdisplay,Transformer,Bulb, Mobile phone. All the components are interfaced to the Microcontroller.AT89S52 has 8051 based architecture microcontroller. It is a low cost efficient Microcontroller. The transformer helps in providing a constant voltage of 5v to the microcontroller. A message is sent from mobile to the GSM through air medium. The GSM which is interfaced to microcontroller sends a signal corresponding to the message given from the mobile. For example If message is 123BULBON then the

GSM sends a signal to the microcontroller to make the relay ON so that power is supplied to the bulb via relay.

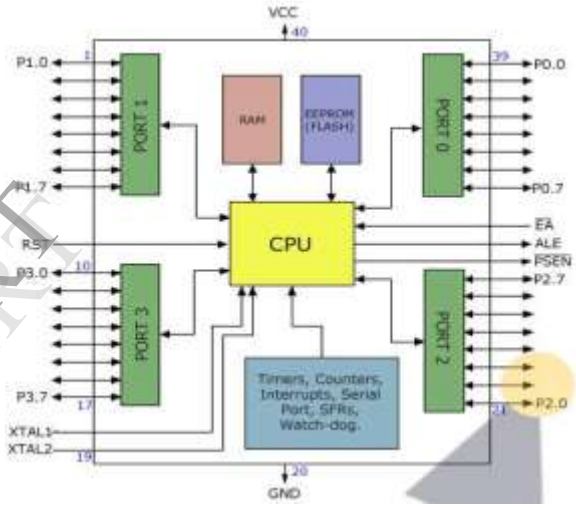
If the message is 456BULBOFF then the GSM sends a signal to the microcontroller to make the relay OFF so that no power goes to the bulb via relay. The LCD is used to display the status of the message, that is, it shows whether the microcontroller is reading the message or not. It also displays the message that a return message is sent to the mobile phone for acknowledgement. Hence LCD is an important component which displays the status of the operation of our system. The relay acts as an electrical switch. It is operated by the signal from the microcontroller. The relay supplies power or cut off power as per the signal received from microcontroller.

2.1 AT89S52

The AT89S52 is a low-power high performance CMOS 8-bit microcontroller with 8K bytes of in system programmable flash memory. It is based on the 8051 architecture. The device is manufactured using Atmel high density nonvolatile memory technology and is compatible with standard 8051 instruction set and pin out. The AT89S52 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 six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator. The microcontroller AT89C52 is not IN-SYSTEM programmable but AT89S52 csn be programmed even when the microcontroller is installed in the system.

The AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The IDLE mode stops CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power down mode saves down the ROM contents but freezes the oscillator, disabling all other chip functions until the next interrupt reset. The on chip flash allows the program memory to be reprogrammed in-system or by a conventional non volatile memory programmer. By combining a versatile 8 bit CPU with in-system programmable flash on monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides high flexibility and cost effective solutions to many embedded control application.

"Figure 2. AT89S52"



"Figure 3. Internal Architecture of AT89S52".

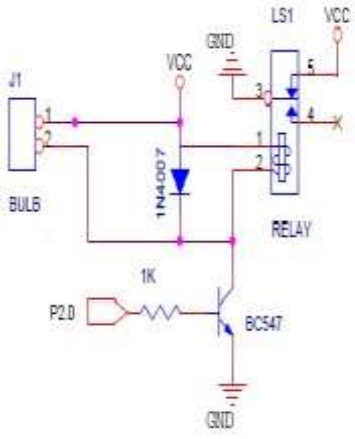
This microcontroller has five software selectable power saving modes. The Idle mode stops the CPU while allowing the RAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next Interrupt or Hardware Reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption.

2.2 GSM

GSM(Global System For Mobile communication) is a standard set by European Telecommunication Standards Institute to describe protocols for second generation(2G) digital cellular network used by mobile phones. The GSM standard was developed as a replacement for first generation(1G) analog cellular network, and originally described a digital circuit switched network optimized for full duplex voice telephony. This was expanded over time to include data communication, first, by circuit switched transport, then packet data transport via GPRS(General Packet Radio Service) and EDGE(Enhanced data rates for GSM evolution).

2.3 RELAY

A relay is an electrically operated switch. Relays are used where it is necessary to control a circuit by a low power signal or where several circuits are controlled by one signal. It is usually an electromagnetic device which has a coil .When this coil is supplied with power, a magnetic field is created which makes it to act as a switch. A solid state contactor is a heavy-duty solid state relay, including the necessary heat sink, used where frequent on/off cycles are required, such as with electric heaters, small electric motors, and lighting loads. There are no moving parts to wear out and there is no contact bounce due to vibration. They are activated by AC control signals or DC control signals from Programmable logic controller (PLCs), PCs, Transistor-transistor logic (TTL) sources, or other microprocessor and microcontroller controls.



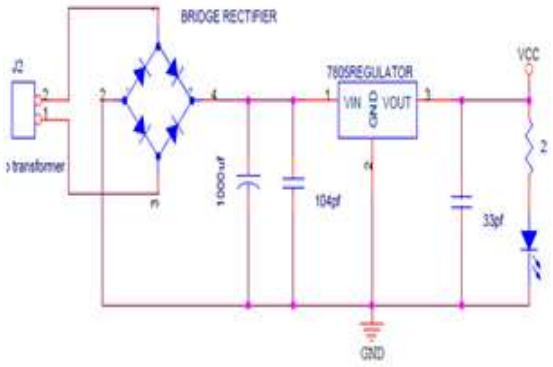
"Figure 4. Relay, Bulb connection"

2.4 LCD

A Liquid Crystal Display is a flat panel, electronic visual display device which do not emit light directly. It uses the light modulating properties of the liquid crystals to display the message. The LCD is a much more informative output device than a single LED. The LCD is a display that can easily show characters on its screen. LCDs range in size, price and configuration, from having a couple of lines to large displays. Some are even very specifically designed for a single application, having only that ability to display set graphics.
LCD is interfaced to the microcontroller which controls the displaying message in the LCD. The microcontroller sends specific digital signals corresponding to the message that is to be displayed by the LCD. These digital signals from microcontroller make LCD to display the required message. Hence it displays the status of the system.

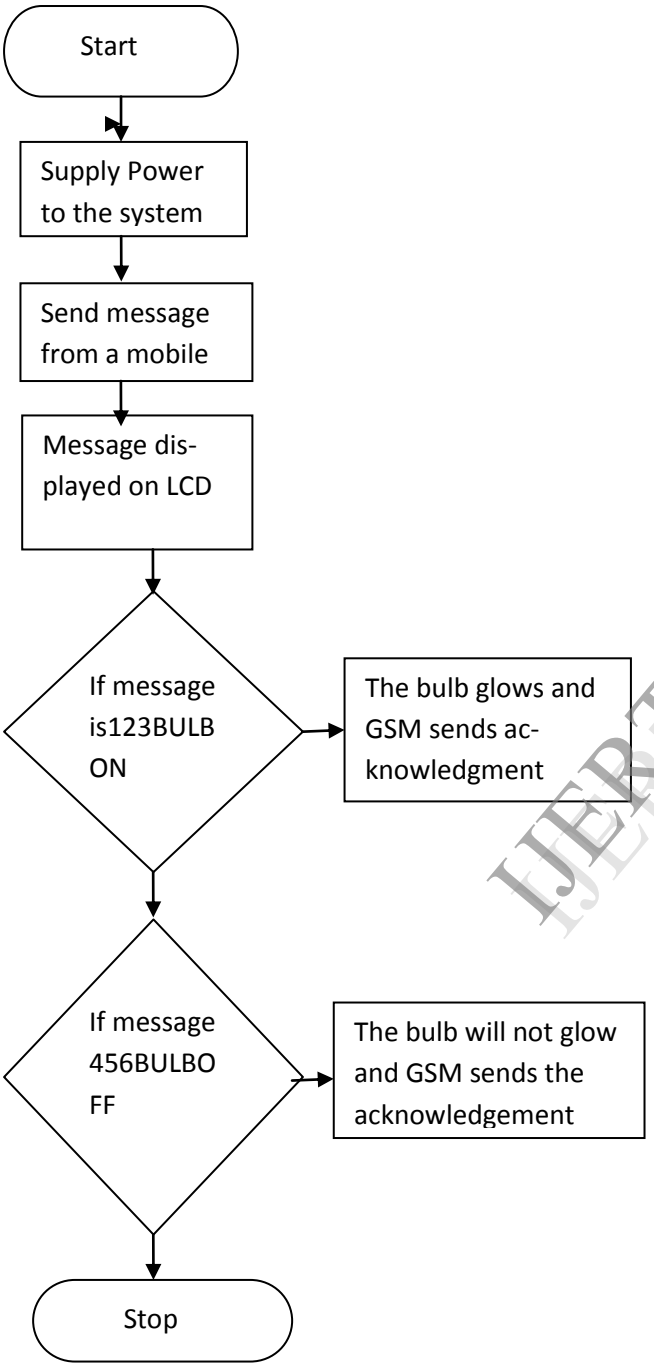
2.5 TRANSFORMER

The transformer is the main component in the power supply unit. It step downs the 240v ac supply and gives it to the bridge rectifier. The pulsating dc output of the bridge rectifier is given to capacitive filter. The filter provides us the dc signal with some ripples created due to the charging and discharging action of the capacitive filter. The dc signal with ripple is converted into perfect dc signal of 5v by LM8405 regulator. This 5v dc signal is given to the microcontroller and to all its interfaced components. The transformer role is very important in supplying the required low voltage signal from the high voltage signal.



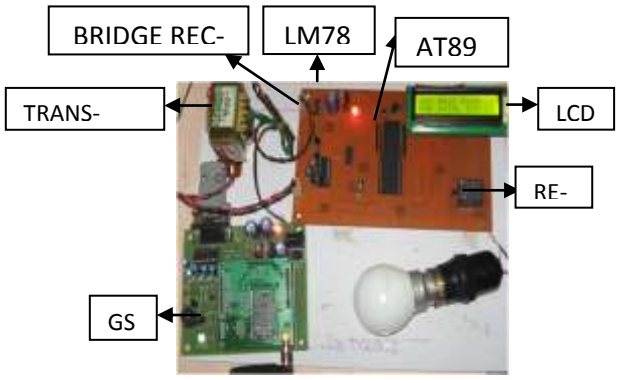
"Figure 5. Power supply unit".

3.FLOW CHART



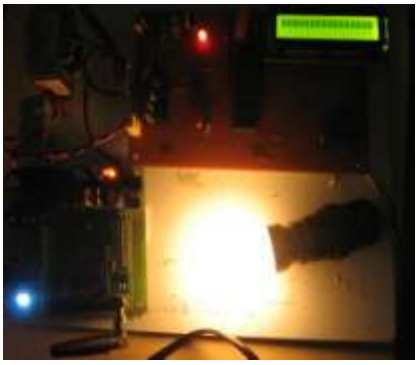
The flow chart gives the complete idea of the working of the system. The message sent from the mobile is analysed by the microcontroller and it switches ON or OFF the bulb through the relay, as per the message sent from the mobile. An acknowl-edgement is sent to the mobile after the required task is done by the microcontroller.

4. EXPERIMENTAL RESULTS



"Figure 6.Circuit diagram"

"Figure 7.LCD Display"



"Figure8.Glowing Bulb"

5. CONCLUSION

In this work we introduced how to control a bulb with message from a mobile using relay capable of handling only (3-5)A of current only. The power in a class room can be done by increasing current handling capabilities of the relay, since the amount of current flowing in class room circuit is much larger than 3-5 A of current. The transformer voltage rating must be increased for controlling power in the class.

6.REFERNCES

[1] Muhammad Ali Mazidi, Janice Gillispie ,Rolin D, "The 8051 Microcontroller and Embedded Systems", Edition 2, pp. 22-45, 2012

[2] Kenneth.J.Ayala, "The 8051 Microcontroller", Edition 3, pp.61-97,2000

[3] Vladimir Gurevich," Electric Relay Principles and Application", pp.45-78,2000

[4] Rappaport," Wireless Communication Principles and Practice" ,Edition 2,2000.

[5] Jia-Ren Chang Chien, Cheng-Chi Tai "The Information Home Appliance Control System—A Bluetooth Universal Type Remote Controller" Proceedings of the 2004 IEEE. International Networking, Sensing & Control. Taipei, Taiwan, Vol. 1,pp. 399-400, March 21-23. 2004.

[6] Malik Sikandar Hayat Khiyal, Aihab Khan, and Erum Shehzadi "SMS Based Wireless Appliance Power Control System (HACS) for Automating Appliances and Security", Issue in Information Science and Information Technology Vol.6, pp 887-894, 2009.

[7] Rifat Shahriyar, Enamul Hoque, S.M. Sohan, Iftekhar Naim, "Remote Controlling of Power using Mobile Telephony", International Journal of Smart Home, Vol. 2, No. 3, July, 2008

[8] Yuksekkaya B, Kayalar A.A, Tosun M.B, Ozcan M.K, Alkar A.Z, "A GSM, internet and speech controlled wireless interactive power control system," Consumer Electronics, IEEE Transactions on Consumer Electronics,Vol.52,no.3,pp.837-843,Aug.2006

[9] Jacob Milliman, "Electronic devices and circuits",Edition.2,pp.52-290,2008

[10] D. Menniti, A.Burgio, G. Fedele "A cost effective ac voltage regulator to mitigate voltage sags and dim lamps in street-lighting
Applications", 9th IEEE conference on Environmental and Electrical Engineering,pp396,399,2010.

[11] Chunguo Jing, Dongmei Shu and Deying Gu," "Design of Streetlight Monitoring and Control System Based on Wireless Sensor Networks" Second IEEE conference on industrial Electronics and Applications pp1-7 2007.

[12] R. Caponetto, G. Dongola, L. Fortuna, N. Riscica and D. Zufacchi , "Power consumption reduction in a remote controlled street lighting" International Symposium on Power Electronics, Electrical Drives, Automation and Motion(SPEEDAM).pp.428-433. 2008.

[13] Ransom.S., Pfisterer,.D., Fischer.S, "Comprehensible Security Synthesis for Wireless sensor Networks", Proceedings of the 3rd international workshop on Meddleware for sensor Networks,Leuven, Belgium, pp.19-24,2008.