GSM Based Autonomous Lamps Illumination System for Efficient Power Management

B.Shiva Krishna
M.Tech, Embedded Systems,
Sindhura College of Engineering and Technology.

K.Pradeep Kumar
Associate Professor,
Sindhura College of Engineering and Technology.

Abstract:

This paper efficiently defines the control of street lightning system and thereby saving electricity which is a major concern worldwide. It also describes the use of wireless sensor networks using GSM for streetlight monitoring and control. The project automatic street lights is an exclusive project which allows the user to control the electrical loads in homes or offices just by sending predefined messages to the controlling system. Each electrical device will be provided with a unique identity. These electrical appliances can be operated only if the correct identity is sent to the device through controlling unit. This method of operating the appliances helps in providing security to the devices and also power saving up to some extent. The user has to send a predefined SMS to the modem and the modem will intimate the controller about the received message and the controller will act in accordance with the received message such as switching on/off an industrial electrical load.

Index-terms:

LPC2148 processor, GSM module, Relays, electrical loads, LCD display, Mobile.

I.INTRODUCTION:

The street lighting is one of the largest energy expenses for a city, accounting for upwards of 35-45% of a municipality's utility budget. An intelligent lighting control system can cut municipal street lighting costs as much as 70% [1]. An intelligent street lighting system is a system that adjusts light output based on usage and occupancy, i.e., automating classification of pedestrian versus cyclist, versus automotive. It illuminates a certain number of street lights ahead and fewer behind, depending on velocity of movement. It also adjusts the light according to the road condition. An intelligent street light management proposes the installation of the wireless based system to

remotely track and control the actual energy consumption of the street lights and take appropriate energy consumption reduction measures through power conditioning and control. The street light controller should be installed on the pole lights which consist of microcontroller along with various sensor and wireless module. The street light controller installed on the street light pole will control LED street lighting depending on traffic flow, communicate data between each street light. The data from the street light controller can be transferred to base station using wireless technology to monitor the system. The mode of operation of the system can be conducted using auto mode and manual mode. The control system will switch on-off the lights at required timings and can also vary the intensity of the street light according to requirement.

II.RELATED WORK:
2.1 ARM PROCESSOR:

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously.

Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set.
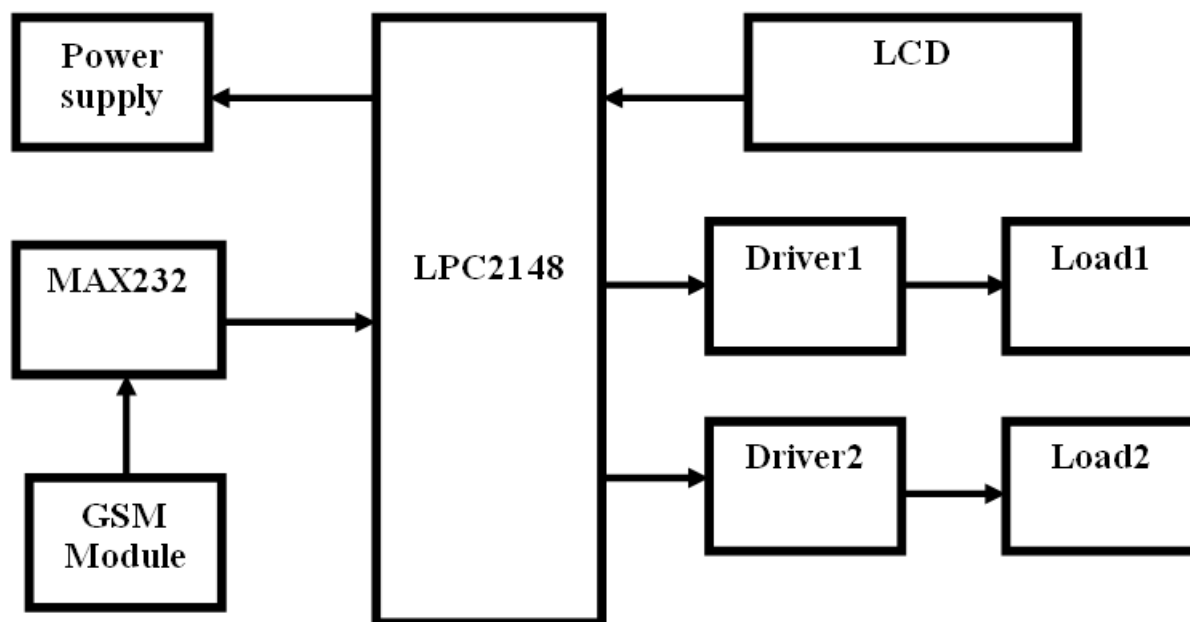
2.2 BLOCK DIAGRAM: 2.3   GSM MODULE:

Figure-1: block diagram of project

2.3. GSM MODULE:

GSM (Global System for Mobile communications: originally from Groupe Spécial Mobile) is the most popular standard for mobile phones in the world. Its promoter, the GSM Association, estimates that 80% of the global mobile market uses the standard.[1] GSM is used by over 3 billion people across more than 212 countries and territories.[2][3] Its ubiquity makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. GSM differs from its predecessors in that both signaling and speech channels are digital, and thus is considered a second generation (2G) mobile phone system. This has also meant that data communication was easy to build into the system. GSM EDGE is a 3G version of the protocol. GSM is the technology that underpins most of the world's mobile phone networks. The GSM platform is a hugely successful wireless technology and an unprecedented story of global achievement and cooperation. GSM has become the world's fastest growing communications technology of all time and the leading global mobile standard, spanning 218 countries. GSM is an open, digital cellular technology used for transmitting mobile voice and data services. GSM operates in the 900MHz and 1.8GHz bands GSM supports data transfer speeds of up to 9.6 kbps, allowing the transmission of basic data services such as SMS.

Figure-2: GSM module

2.4 RELAYS:

A relay is an electrically operated switch. When you turn it on, it switches on way. When it is off, it switches the other way. You can use a relay to switch on and off a high current device. A relay has an electromagnet, called a coil, and a lightweight switch inside it. When you energize the coil, a piece of the switch is attracted by the coil's magnetic field, which switches the switch on or off. An SPST relay (Single Pole Single Throw) simply opens or closes a signal path. This relay is typically normally open when power is removed, and the relay needs to be energized in order to connect the signal path.

A DPST relay (Double pole Single Throw) is in essence two SPST relays but energized from the same coil. A SPDT (Single Pole Double Throw) relay has one normally open and one normally closed path and a DPDT (Double Pole Double Throw) relay is in essence two SPDT relays which are energized from the same coil. A SPDT relay is also referred as a Form C relay.
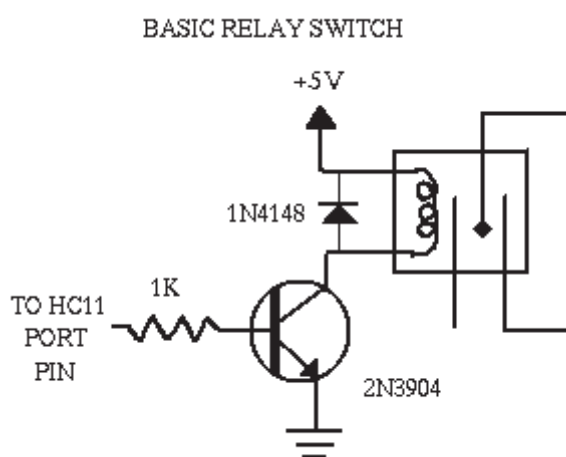

Figure-3: relay circuit

III.RESULTS:

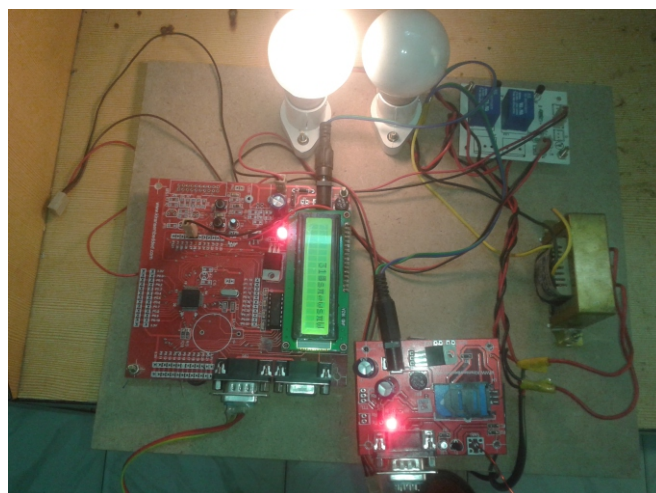**Figure-4: ARM processor**

Figure-5: Output of Project

IV. CONCLUSION:

The main issue for the success of integrated solutions in street is to define appropriate communication protocol and the media for the information transfer. Wireless Sensor networks may present a new solution to bring the installed cost down and to ensure energy efficiency. Over the past 10years many new RF solutions have been developed into our every-day life. It is expected that soon a reliable, robust, easy-to-install and secure wireless network technology for connecting devices on streets and in buildings will gain market acceptance and substantial shares of new and retrofit installations. GSM is heading in this direction. Nevertheless it is still not well defined on a semantic point of view.

V. REFERENCES:

[1]Reza Mohamaddoust, AbolfazlToroghiHaghighat, MohamadJavadMotahari Sharif and NiccoloCapanni, "A Novel Design of an Automatic Lighting Control System for a Wireless Sensor Network with Increased Sensor Lifetime and Reduced Sensor Numbers", Sensors (2011), Volume No. - 11(9), pp. 8933-8952.

[2] De Dominicis, C.M.; Flammini, A.; Sisinni, E.; Fasanotti, L.; Floreani, F.; "On the development of a wireless self-localizing streetlight monitoring system ", Sensors Applications Symposium IEEE, pp. 233 - 238 ,2011.

[3] Gustavo W. Denardin, Carlos H. Barriquello, AlexandreCampos, Rafael A. Pinto, "Control Network for Modern Street Lighting Systems", IEEE symposium on Industrial Electronics (ISIE), (2011), pp. 1282 – 1289.

[4] Jing Chunguo, Wang Yan Sun, Wenyi Song, "Design of Street Light Pole Controller Based on WSN", The Tenth International Conference on Electronic Measurement & Instruments, ICEMI (2011), pp. 147 – 150.

[5] Shentu, Xudan; Li, Wenjun; Sun, Lingling; Gong, Siliang, "A new streetlight monitoring system based on wireless sensor networks", International Conference on Information Science and Engineering, pp. 6394 – 6397.

[6] Wu Yue; Shi Changhong; Zhang Xianghong; Yang Wei; "Design of new intelligent street light control system ",, 8th IEEE international Conferences on Control and Automation (ICCA), (2010) , Page(s): 1423 – 1427.

[7] Hengyu Wu; Minli Tang; Guo Huang, "Design of multifunctional street light control system based on AT89S52 single-chip microcomputer", , IEEE 2nd International Conferences on Industrial Mechatronics and Automation (ICIMA), (2010), Page(s): 134 – 137.

[8] J. L. Huang, Z. F. Wang, L. G. Li, and L. H. Wang," Based on ZigBee smart wireless lighting wall controller design,"Chinese Journal of Scientific Instrument, vol. 30,no. 6, June 2009.