

# IMPLEMENTATION OF HIGH EFFICIENCY AND INTELLIGENT STREET LIGHTING SYSTEM USING A GSM NETWORK

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## ABSTRACT:

The proposed system can optimize management and efficiency of street lighting systems. It uses GSM-based wireless devices which enable more efficient street lamp-system management with an advanced interface and control architecture. It uses a sensor (like Presence sensor, LDR) combination to control and guarantee the desired system parameters; the information is transferred from Street Light to Mobile phone using GSM modules and is sent to a control terminal used to check the state of the street lamps and to take appropriate measures in case of failure. IR sensor to find the presence and intimate to ARM7, depending on this information particular street light will be turned ON.

Another feature in this system is light intensity based street light ON/OFF system; this is achieved by using LDR sensor. A feedback loop is implemented to know that whether street light properly working or not by using LDR sensor.

## Keywords:

Automation, Control System, LDR, GSM.

## 1. INTRODUCTION:

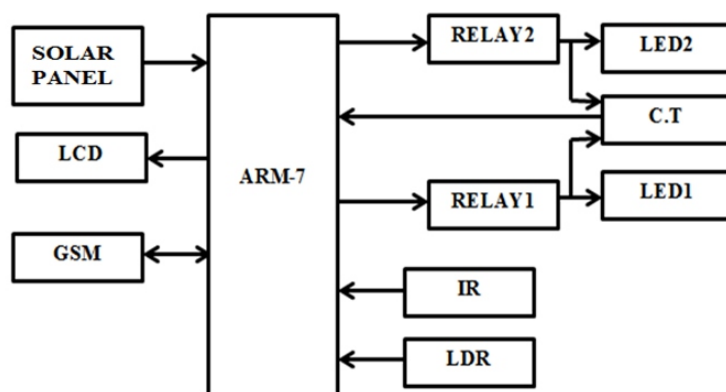
Lighting systems, especially in the public sector, are still designed according to the old standards of reliability and they often do not take advantage of the latest technological developments. In many cases, this is related to the plant administrators who have not completed the return of the expenses derived from the construction of existing facilities yet.

However, the recent increasing pressure related to the raw material costs [5] and the greater social sensitivity to environmental issues are leading manufacturers to develop new techniques and technologies which allow significant cost savings and a greater respect for the environment.

We can find three possible solutions to these problems in the literature. The first one, and perhaps the most intuitive, is the use of new technologies for the sources of light [2]. In this area, Light-Emitting Diode (LED) technology is the best solution because it offers many benefits. It has already considered this possibility, designing an advanced street lighting system based on LEDs. The second possible solution, and perhaps the

most revolutionary, is the use of an automatic system based on intelligent lamp posts that send information to a central control system, thus simplifying management and maintenance issues. It has been developed a street lamp system using the general-packet radio service (GPRS) [5], power-line carrier, or Global Systems for Mobile Communications (GSM) transmissions.

## 2. BLOCK DIAGRAM



## 3. CONTROLLER:

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 [6], and the instruction set and related decode mechanism are much simpler than those of microprogrammed 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 (1). 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 [5]. 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.

#### 4. POWER MANAGEMENT:

The system was designed to be standing alone, supplied by solarpanel energy, with relevant advantages resulting from this kindof power supply. It is possible to avoid the tedious and expensivewiring of the supply power network, with considerable savingsand ease of implementation.The control circuit is designed toconsume the lowest possible power, minimizing the battery capacityand the energy supplied by the solar panel. These goalswere achieved through the use of the GSM module for transmitting and receiving information, using LED lamps as a replacement for standard lamps and using special power-saving solutions for microcontrollers and radio modules[4]. The program,which controls the system, is designed primarily to save energy.First, since the system only works at night, avoiding wastingenergy during daylight hours occurs when the only active deviceis the solar panel recharging the battery. Second, various-sensors allow the system to work only when necessary. Third,the system implies highly efficient LEDs to ensure proper illuminationand ensure energy savings. For our work, a 84-lm/W

#### 5.LDR:

Light-dependent resistor(LDR), photo resistor, photoconductor, or photocell, is a variable resistor whose value decreases with increasing incident light intensity. An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band[8]. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.LDRs are still used in electronic devices that need light detection capability, such as security alarms, street lamps and clock radios .

#### 6.GLOBAL SYSTEM FOR MOBILE COMMUNICATION:

It is a globally accepted standard for digital cellular communication. GSM is the name of standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900MHZ throughout the evolution of cellular telecommunications; various systems have been developed without the benefit of standardized specification[10]. These results in many problems directly related to compatibility, especially with the development of digital radio technology. The GSM standard is intended to address these problems.

#### 7.SOFTWARE ARCHITECTURE AND IMPLEMENTATION

##### 7.1. OrCAD:

OrCAD is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly to create electronic prints for manufacturing of printed circuit boards, by electronic design engineers and electronic technicians to manufacture electronic schematics.

The name OrCAD is a portmanteau, reflecting the software's origins: Oregon + CAD.

##### 7.2. Keil Micro vision 3 IDE:

The  $\mu$ Vision development platform is easy-to-use and it helps you quickly create embedded programs that work[9]. The  $\mu$ Vision IDE (Integrated Development Environment) from Keil combines project management, source code editing, program debugging, and complete simulation in one powerful environment. Code written in 'EMBEDDED C'.

The  $\mu$ Vision3 IDE and Debugger is the central part of the Keil development tool chain.  $\mu$ Vision3 offers a Build Mode and a Debug Mode.In the  $\mu$ Vision3 Build Mode you maintain the project files and generate the application.

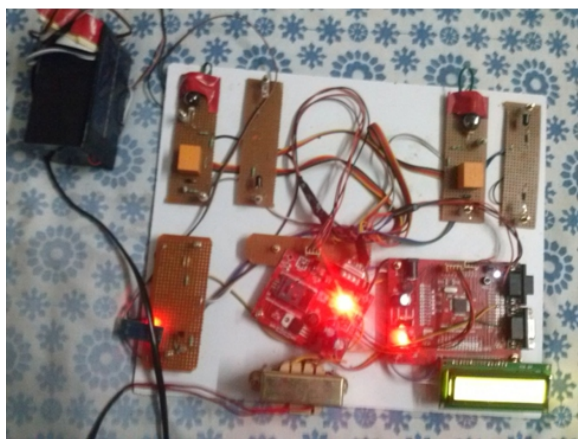
##### 7.3. Flash Magic Software:

The method to download Hex File into Flash Memory of MCU in Board is to use Program Flash Magic that is connected with MCU through Serial Port of computer PC.

#### 8. FLOW CHART REPRESENTATION:



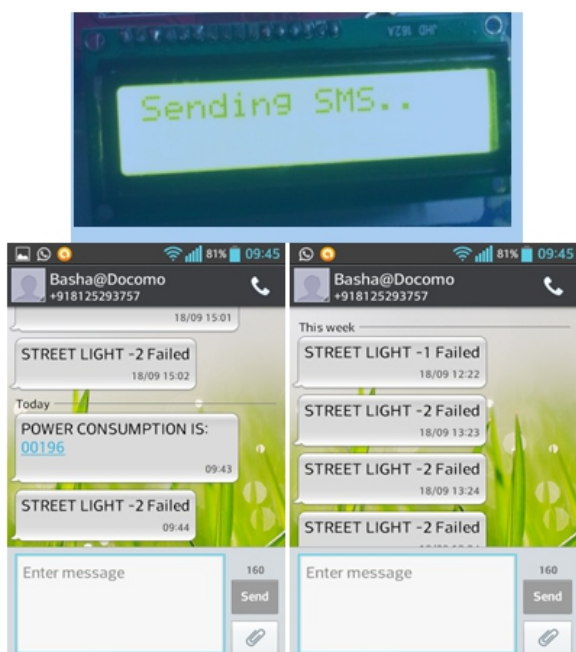
## 9. KIT PRESENTATION:



## 10. CONCLUSION:

This paper describes a new intelligent street lighting system which integrates new technologies available on the market to offer higher efficiency and considerable savings. This can be achieved using the highly efficient LED technology supplied by renewable energy of solar panels, for which the cost of energy is independent from the power supplier prices, combined to an intelligent management of the lamp posts derived by a control system switching on the light only when necessary, increasing the lamps' lifetime [9]. The system can be adopted in the future for loads supplied by the power system, which enables the monitoring of energy consumption. This situation is particularly interesting in the case of economic incentives offered to clients that enable remote control of their loads and can be useful, for example, to prevent the system blackout. Moreover, new perspectives arise in billing and in the intelligent management of remotely controlled loads and for smart grid and smart metering applications.

## 11. RESULT:



## 12. REFERENCES:

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