**Abstract :**

Street light is a raised source of light that is commonly used along walkways and streets when the surrounding turns dark. Nowadays, most of the existing street light systems are wired which are not only difficult to construct but also has poor flexibility. To overcome this, wireless system is required. In this paper, we are using GSM technology which uses power efficiently by remotely monitoring and controlling the system. This system will ease the fault detection and maintenance. System allows us to make the most efficient use of the energy received from the sun to power street lights. Real Time Clock and light intensity at the same time. Microcontroller processes the information from the sensors and is transferred to nearby control terminal (Base station with Arduino unoI as a compute module) to monitor the status of the street lamp using GSM technology via Short Message Service (SMS). Designed system is visualized by creating Graphical User Interface (GUI). Thus, the implementation of such system will result in energy saving, lower cost of maintenance, increased lifespan and hence the enhanced performance of the system.

**Existing system :**

Street light is poorly designed and not regularly maintained. The switches of street lights are switched ON/OFF manually

by the workman in the entire zone. This leads to the rise of man power and time. As it is human operation it is lead to errors. The street lights are switched ON/OFF manually by the workman in all the zones. This leads to the rise of man power and time. As it is human operation it is prone to errors. There is a complaint register in every zonal office street light section.

The maintenance of street light is done by the line technician. The complaint received from public and corporation officials either over phone is in person being recorded in the complaint register. The complaint which is entered is cleared by the technician.

**Proposed System :**

To reduce man power we provided automatic street light fault detection using arduino uno. This system uses GSM 800L receiving and transmitting device called Global system for mobile communication .

Fault detection senses and transmit signal to micro controller named arduino uno . Arduino uno transmit data to GSM 800L. GSM send sms(FAULT DETECTED) to Electricity Board . This system reduce accident and power losses in light poles.

**ADVANTAGES**

Cost effective.

Practical and affordable.

Pollution free and the safest way to save energy.

Reduces human resource and provides security.

Ensure security, lower maintenance.

Enhance performance and life of the lamps.

**Working principle**

The system is designed in such a way that in the street lights circuit we place light sensors and which are responsible to automatically on/off switching. Whenever the fault occur in the system it detected by sensors and this send signal to the microcontroller and with the help of GSM module attached with the circuit for sending message to the control station. With this information available in the control station, the technician can easily locate the particular light which reduces the time to identify it and repair it. The main objective of the proposed system is to accomplish individual faults repaired within less working hours instead of taking more time.

**USES :**

Power conservation by automatic switching off.

Automatic on/off switching operation. \

Street light fault detection.

If complaint not repaired by area wise system then it send complaint to the higher level authority.

Wireless Communication.

Can be implementing on any street light circuit.  
 Reduces power consumption.  
 Reduces man power.  
 Enhance the life time of the street light lamp.  
 Reduces power consumption.

**APPLICATION :**

Street light fault detection.

Parking, malls, industries.

Home power control system.

Hospitals, Institutions/Organization.

Automatic switching of street light.

Corporate field

**Conclusion**

We conclude that the system reduce the amount of energy used from an old to an entirely new situation. In remote as well as urban areas where traffic is low then this proposed system is correct for street lighting. It provides a low cost infrastructure for managing street lighting system. Energy usage can be obtained by making it eco-friendly in usage.

**Arduino UNO :**

[Arduino](http://arduino.cc/) is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a [microcontroller](http://en.wikipedia.org/wiki/Microcontroller)) and a piece of [software](http://arduino.cc/en/Main/Software), or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

### **Power (USB / Barrel Jack)**

Every Arduino board needs a way to be connected to a power source. The Arduino UNO can be powered from a USB cable coming from your computer or a wall power supply ([like this](https://www.sparkfun.com/products/8269)) that is terminated in a barrel jack. In the picture above the USB connection is labeled  and the barrel jack is labeled .

The USB connection is also how you will load code onto your Arduino board. More on how to program with Arduino can be found in our [Installing and Programming Arduino](https://learn.sparkfun.com/tutorials/installing-arduino-ide) tutorial.

****NOTE:**** Do NOT use a power supply greater than 20 Volts as you will overpower (and thereby destroy) your Arduino. The recommended voltage for most Arduino models is between 6 and 12 Volts.

### Pins (5V, 3.3V, GND, Analog, Digital, PWM, AREF)

The pins on your Arduino are the places where you connect wires to construct a circuit (probably in conjuction with a [breadboard](https://learn.sparkfun.com/tutorials/how-to-use-a-breadboard/) and some [wire](https://learn.sparkfun.com/tutorials/working-with-wire). They usually have black plastic ‘headers’ that allow you to just plug a wire right into the board. The Arduino has several different kinds of pins, each of which is labeled on the board and used for different functions.

* ****GND**** : Short for ‘Ground’. There are several GND pins on the Arduino, any of which can be used to ground your circuit.
* ****5V & 3.3V**** : As you might guess, the 5V pin supplies 5 volts of power, and the 3.3V pin supplies 3.3 volts of power. Most of the simple components used with the Arduino run happily off of 5 or 3.3 volts.
* ****Analog**** : The area of pins under the ‘Analog In’ label (A0 through A5 on the UNO) are Analog In pins. These pins can read the signal from an analog sensor (like a [temperature sensor](https://www.sparkfun.com/products/10988)) and convert it into a digital value that we can read.
* ****Digital**** : Across from the analog pins are the digital pins (0 through 13 on the UNO). These pins can be used for both digital input (like telling if a button is pushed) and digital output (like powering an LED).
* ****PWM**** : You may have noticed the tilde (~) next to some of the digital pins (3, 5, 6, 9, 10, and 11 on the UNO). These pins act as normal digital pins, but can also be used for something called Pulse-Width Modulation (PWM). We have [a tutorial on PWM](https://learn.sparkfun.com/tutorials/pulse-width-modulation), but for now, think of these pins as being able to simulate analog output (like fading an LED in and out).
* ****AREF****: Stands for Analog Reference. Most of the time you can leave this pin alone. It is sometimes used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

### **Reset Button**

Just like the original Nintendo, the Arduino has a reset button .Pushing it will temporarily connect the reset pin to ground and restart any code that is loaded on the Arduino. This can be very useful if your code doesn’t repeat, but you want to test it multiple times. Unlike the original Nintendo however, blowing on the Arduino doesn't usually fix any problems.

### Power LED Indicator

Just beneath and to the right of the word “UNO” on your circuit board, there’s a tiny LED next to the word ‘ON’ . This LED should light up whenever you plug your Arduino into a power source. If this light doesn’t turn on, there’s a good chance something is wrong. Time to re-check your circuit!

### **TX RX LEDs**

TX is short for transmit, RX is short for receive. These markings appear quite a bit in electronics to indicate the pins responsible for [serial communication](https://learn.sparkfun.com/tutorials/serial-communication). In our case, there are two places on the Arduino UNO where TX and RX appear -- once by digital pins 0 and 1, and a second time next to the TX and RX indicator LEDs . These LEDs will give us some nice visual indications whenever our Arduino is receiving or transmitting data (like when we’re loading a new program onto the board).

### Main IC

The black thing with all the metal legs is an IC, or Integrated Circuit . Think of it as the brains of our Arduino. The main IC on the Arduino is slightly different from board type to board type, but is usually from the ATmega line of IC’s from the ATMEL company. This can be important, as you may need to know the IC type (along with your board type) before loading up a new program from the Arduino software. This information can usually be found in writing on the top side of the IC. If you want to know more about the difference between various IC's, reading the datasheets is often a good idea.

### Voltage Regulator

The voltage regulator  is not actually something you can (or should) interact with on the Arduino. But it is potentially useful to know that it is there and what it’s for. The voltage regulator does exactly what it says -- it controls the amount of voltage that is let into the Arduino board. Think of it as a kind of gatekeeper; it will turn away an extra voltage that might harm the circuit. Of course, it has its limits, so don’t hook up your Arduino to anything greater than 20 volts.

**GSM 800L :**

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls. Low cost and small footprint and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting power module boots up, searches for cellular network and login automatically. On board LED displays connection state (no network coverage - fast blinking, logged in - slow blinking).

****NOTICE:**** Be prepared to handle huge power consumption with peek up to 2A. Maximum voltage on UART in this module is 2.8V. Higher voltage will kill the module.

## Two antennas!

****This module have two antennas included****. First is made of wire (which solders directly to NET pin on PCB) - very useful in narrow places. Second - PCB antenna - with double sided tape and attached pigtail cable with IPX connector. This one have better performance and allows to put your module inside a metal case - as long the antenna is outside.

## Specification

* Supply voltage: 3.8V - 4.2V
* Recommended supply voltage: 4V
* Power consumption:
  + sleep mode < 2.0mA
  + idle mode < 7.0mA
  + GSM transmission (avg): 350 mA
  + GSM transmission (peek): 2000mA
* Module size: 25 x 23 mm
* Interface: UART (max. 2.8V) and AT commands
* SIM card socket: microSIM (bottom side)
* Supported frequencies: Quad Band (850 / 950 / 1800 /1900 MHz)
* Antenna connector: IPX
* Status signaling: LED
* Working temperature range: -40 do +85° C

**RELAY**

****5V Relay Module**** is a relay interface board, it can be controlled directly by a wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on. It uses a low level triggered control signal (3.3-5VDC) to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in an automatic control circuit. To put it simply, it is an automatic switch to control a high-current circuit with a low-current signal.5V relay signal input voltage range, 0-5V. VCC power to the system. JD-VCC relay in the power supply. JD-VCC and VCC can be a shorted.

### ****The features of Relay module:****

* Good for safe control of higher amperage circuits. In power systems, the lower current can control the higher one.
* 2-channel high voltage system output, meeting the needs of dual channel control.
* Brand new and high quality.
* Standard interface that can be controlled directly by microcontroller (Arduino , 8051, AVR, PIC, DSP, ARM)]
* Wide range of controllable voltages.
* Being able to control high load current, which can reach 250V, 10A or 125V, 15A
* With a normally-open (NO) contact and a normally-closed (NC) contact.
* Around the board with 4 mounting holes, easy installation and fixing
* It has a common end, a beginning, a closed-end

### ****Specification of 2-Channel Relay module:****

* Relay Module; Model : JQC-3FF-S-Z, 2 Channel
* Voltage to operate: 5V D
* Color : Blue Relays on a black PCB
* Load : 10A, AC 250V/ 15A, 125V

**RTC REAL TIME CLOCK**

****RTC**** means ****Real Time Clock****. RTC modules are simply TIME and DATE remembering systems which have battery setup which in the absence of external power keeps the module running. This keeps the TIME and DATE up to date. So we can have accurate TIME and DATE from RTC module whenever we want.

### ****DS3231 RTC MODULE Features****

* RTC counts seconds, minutes, hours and year
* Accuracy: +2ppm to -2ppm for 0ºC to +40ºC , +3.5ppm to -3.5ppm for -40ºC to +85ºC
* Digital temperature sensor with ±3ºC accuracy
* Two Time-of-day alarms
* Programmable square wave output
* Register for Aging trim
* 400Khz I2C interface
* Low power consumption
* Automatic power failure battery switch circuitry
* CR2032 battery backup with two to three year life
* Potable size

### ****DS3231 RTC MODULE Specifications****

* Operating  voltage of  DS3231 MODULE: 2.3V – 5.5V
* Can operate on LOW voltages
* Consumes 500nA on battery backup
* Maximum voltage at SDA , SCL : VCC + 0.3V
* Operating temperature: -45ºC to +80ºC

As mentioned earlier the only way to communicate with this RTC module is through ****I2C interface****. The data is sent to the module or received from the module though I2C interface. So we have to get the information of DATE and TIME through this interface.

The module can work on +5V regulated power and higher voltage may damage the module. The I2C interface is established as shown in figure. All you need to do is connect SDA of module to SDA of controller and SCL is connected to SCL of controller.

The communication between controller and module is really complex. Usually the information is sent or received byte to byte. So using libraries which are written for the module DS3231 is ideal. Using libraries makes the communication easy. All you need to do is download these libraries and call them in programs. Once the header file is included, the controller performs the communication by itself and provides the date and time for you. The alarm clock can also be set or changed easily using libraries.

 And when the power goes down, the RTC module chip draws the power from battery source connected to it automatically. So the time will be up to date. And when the system restarts the controller can get the real time from module without error.

**POWER SUPPLY BOARD**

The power supply board is a basic essential interface for regulating and supplying power to the connected components. The female barrel jack connector on the power supply board acts as the input terminal and the terminal blocks on the board enables you to connect to the components using the [male bread board wires](http://sproboticworks.com/shop/products/bread-board-wires-m--.html" \t "/Users/karthick/Documents\\x/_blank). Simply use a [USB to barrel jack cable](http://sproboticworks.com/shop/products/usb-to-barrel-jack-connector.html" \t "/Users/karthick/Documents\\x/_blank) to connect your power supply with the board.

**DC TO DC BUCK CONVERTER**

A buck converter (step down converter) is a DC to DC power converter; which steps down voltage (while stepping up current) from its input (supply) to its output (load). DC-DC step-down converters basically take a higher input voltage and convert it to a lower output voltage by chopping it up by rapidly switching the output power.