

# Renewable Energy Based Home Automation Using GSM

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## ABSTRACT

The elevation in electronics and communications regarding embedded systems is to generate the energy by using renewable energy sources. For management of home appliances we can use this energy. In the earlier days, the electric home equipments can be controlled and monitored with the help of homespun power lines by using power line communication technology. But, now days a GSM technology is used for the electric home appliances to control and monitor more than before. This proposal describes the methodology of renewable energy based home automation in which two things are consider one is energy consumption and another is energy generation. In this, GSM is used for monitoring energy consumption of home equipments and Battery optimization with LCD is used to monitoring energy generation. This design also encapsulates the PIR sensor that detects the presence of the human motion and it allows the power on the corresponding home appliances .Light dependant resistor is a resistor whose resistance decreases with increases incident light intensity. if light falls on the device, its resistance increases and doesn't conduct electricity. This control the home energy utilization schedule to slump the energy cost. The system gives more efficient energy and result in home energy cost reduction.

**Keywords :** GSM, PIR, LDR.

## I. INTRODUCTION

As we all know that solar energy is one of the renewable energy sources .In this, solar energy is used for home appliances to reduce the power cost and to increase the suitable power outcome for peoples. Therefore ,it requires an acceptable electronic equipments to implement this technology. The need of solar energy is to reduce the power cost and to in order to decrease the power cuts. This automatically reduces the human interaction with the devices mostly. The major issue facing by us are power cuts and also paying more amount of money to the government. Now a days every home/office is getting less amount of power from the transformers because some of the pupils uses ac and other electronic appliances which consumes a large amount of energy that leading to increase the occurrence short circuits

(Damaging of home appliances due to low power).It includes the microcontroller with GSM for operating the home appliances from anywhere around the home/office. Automatic human sensing sensors (PIR) used to reduce the power consumption, and here preferable battery level indicator and temperature sensors used to send an information to the user

through GSM. Normal home automation technologies consist of sensors, microcontroller's, relays and loads. But this type of home automation includes a variety of parameters like solar inverter, lcd, battery optimization using automatic battery level indication, PIR and LDR sensors. Power management is set as an automatic in this technique. This enables the humans to avoid unwanted purchasing ,payments and also reduce the work. This will become a good opportunity for the pupils in the future.

## II. LITERATURE SURVEY

In Architecture of existing smart home control network has Bluetooth and Zigbee while another issue in a smart home is how a user can remotely connect and get access to a smart home control network. Therefore, this system has a drawback of extending the coverage of a smart home control network and also it didn't adopt the mobile cellular service architecture such as GSM, GPRS, or 3G/4G. Thus there is a difficulty in remotely monitoring the smart home and controlling it in real time.

## III. PROPOSED STRATEGY

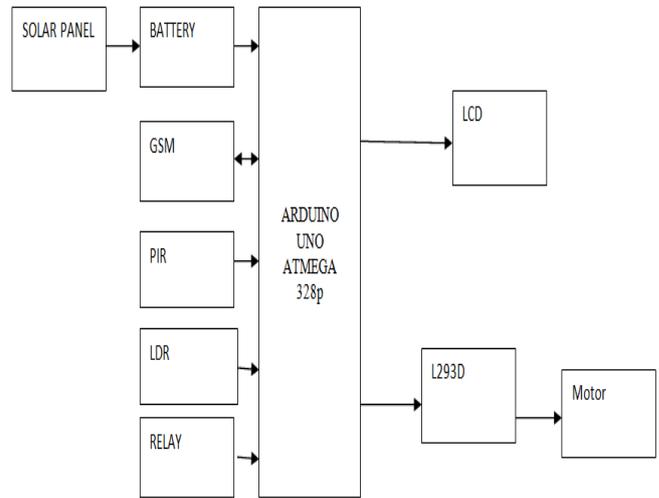
Electricity is the most adaptable and extensively used form of energy with a continuous growing global demand. Electrical energy generation is the one, currently the largest single source of carbon dioxide emissions, making a significant contribution to climate change. To diminish the implications of climate change, the current electrical system needs to undergo significant adjustments.

The electrical power system distributes electrical energy to industry, commercial and residential users, to meet the ever-growing demand. Most of today's generation capacity relies on fossil fuels and contributes significantly to the increase of carbon dioxide in the world's atmosphere, with negative consequences for the climate and society in general.

Renewable energy sources, such as solar power, wind power and fuel cell etc., should be used to meet the increasing energy. There are many challenges caused by integrating renewable energy sources into home automation that can be solved by redesigning the architecture of the project. The conventional power system should be more reliable, environmental friendly and intelligent comparing to the existing systems. Here we incorporated PIR & LDR sensors to overcome the power consumption problem and also

implemented GSM design to operate the devices from larger distances.

### BLOCK DIAGRAM:



### SOLAR PANNEL WITH INVERTER

The Solar Inverter is a foremost device in any solar power system. Its basic function of the inverter is to change the variable Direct Current output of the solar panels into Alternating Current. The various electrical and electronic components connected in the circuit help in the conversion. The converted Alternating Current power is used for running your appliances like the TV, Refrigerator, Microwave, etc. For some peculiar applications, we can directly use the DC power from the batteries through solar panel such as LED street lights, a cell phone charger. Generally, the power of a home solar power system is used for power AC loads.



Figure 1. Solar Inverter.

### AT MEGA 328 MICROCONTROLLER

This is the heart of the project, as we know the processor is the heart of any project. Here ARDUINO controller takes that job. There are two memory blocks in each of these AT-mega 328 controllers. The program Memory and Data Memory have separate buses so that simultaneous access can occur. The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip EEPROM Flash drive release the program memory to be reprogrammed. This microcontroller have only 14 digital pins and 6 analog pins where we can use these pins to interconnect many modules or devices .This controller will results in high performance due to 16Mhz clock frequency. Code dumping is as same as other micro controllers used earlier. It provides a highly flexible and cost effective solution to many embedded control applications



Figure 2

### LIQUID CRYSTAL DISPLAY (LCD)

LCD (Liquid Crystal Display) screen is a electronic display and find a liberal range of applications. A 16x2 LCD display is very principal module and is most frequently used in various devices and circuits. These modules are popular over seven segments and other multi segment LEDs. The LCD's are more cost effective, quickly programmable and very much usable to clearly display the special characters (unlike in seven segment, animations and so on). A 16x2 LCD means it can display 16 characters per line and there are two such lines.

This LCD has two modes, namely, Command mode and Data mode. The command register stores the command instructions given to the LCD and the data register stores the data instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc.



Figure 3. Liquid Crystal Display (LCD)

### L293D MOTOR DRIVER MODULE

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotates the motor in forward or backward directions respectively. Enable pins 1 and 9 must be high for motors to start operating. When an enable input is high, the associated driver gets ready to operate. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

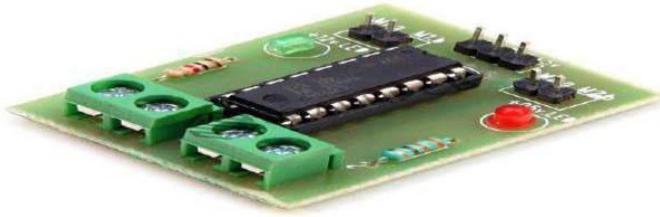


Figure 4. L293D motor driver module

Pin No	Function	Name
1	Enable pin for Motor 1; active high	Enable 1,2
2	Input 1 for Motor 1	Input 1
3	Output 1 for Motor 1	Output 1
4	Ground (0V)	Ground
5	Ground (0V)	Ground
6	Output 2 for Motor 1	Output 2
7	Input 2 for Motor 1	Input 2
8	Supply voltage for Motors; 9-12V (up to 36V)	Vcc <sub>2</sub>
9	Enable pin for Motor 2; active high	Enable 3,4
10	Input 1 for Motor 2	Input 3
11	Output 1 for Motor 2	Output 3
12	Ground (0V)	Ground
13	Ground (0V)	Ground
14	Output 2 for Motor 2	Output 4
15	Input 2 for Motor 2	Input 4
16	Supply voltage; 5V (up to 36V)	Vcc <sub>1</sub>

Figure 5. Pin Description of L293D Module

### RELAY

A relay is used to confine one electrical circuit from another. It allows a low current control circuit to make or break an electrically closed off high current circuit path. The basic relay consists of a coil and a set of contacts. The most common relay coil is a length of magnet wire wrapped around a metal core. When voltage is applied to the coil, current passes through the wire and creates a magnetic field. This magnetic field pulls the contacts together and holds them there until the current flow in the coil has stopped. The diagram below shows the parts of a simple relay.

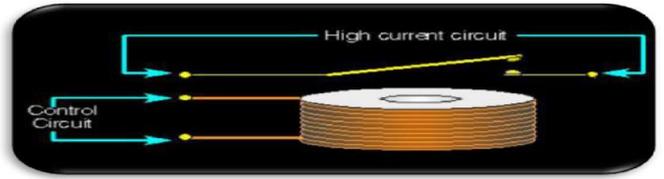


Figure 6. Relay Model

### MOTOR

An **electric motor** is an electrical device which converts electrical energy into mechanical energy. The converse of this is the alternation of mechanical energy into electrical energy and is done by an electric generator, which will be much in common with a motor. These motors are controlled by L293D IC through atmega328 microcontroller to operate this from anywhere. In this the input will be given by the user in the form of digital from the mobile and it accepts it and generates the output.



Figure 7. Dc Motor

### PIR SENSOR MODULE

A PIR sensor is a motion detector used to control an outdoor, self regulating light. An indoor light switch equipped with PIR-based occupancy sensor .A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in alarms for security purpose and automatically activated lighting systems. They are commonly called simply "PIR". An individual PIR sensor, that detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects

in front of the sensor. When an object, such as a human, passes in front of the background it will automatically senses and light on. The sensor converts the resulting change in the approaching infrared radiation into a change in the output voltage, and this triggers the detection.

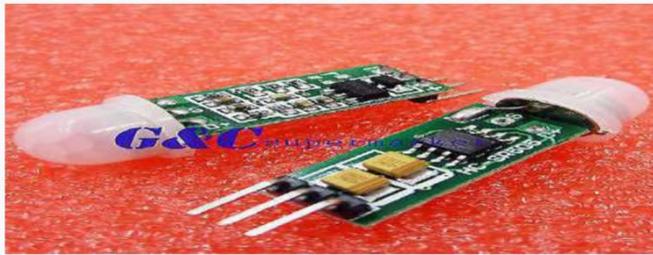


Figure 8

### LIGHT DEPENDENT RESISTOR

Light dependant resistor is a resistor whose resistance decreases with increasing of the incident light intensity. If light falls on the device, its resistance increases and doesn't conduct electricity. A LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons immersed by the semiconductor give bound electrons enough energy to jump into the conduction band. A photoelectric device can be either inmost or outer. In intrinsic devices, the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire band gap. LDRs are still used in electronic devices that need light exposure capability, such as security alarms, street lamps. In this proposal it reduces the power consumption and human interaction with the devices.



Figure 9. Ldr (Light Dependent Resistor Module)

### EXPERIMENTAL RESULTS



Figure 10. Renewable Energy Source Kit

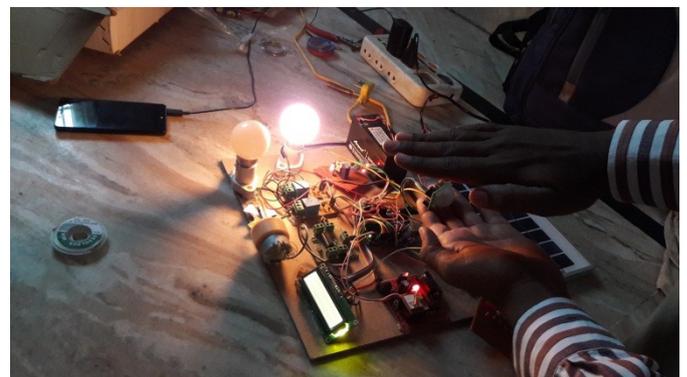


Figure 11. Pir Motion Detected Image



Figure 12. Ldr Output

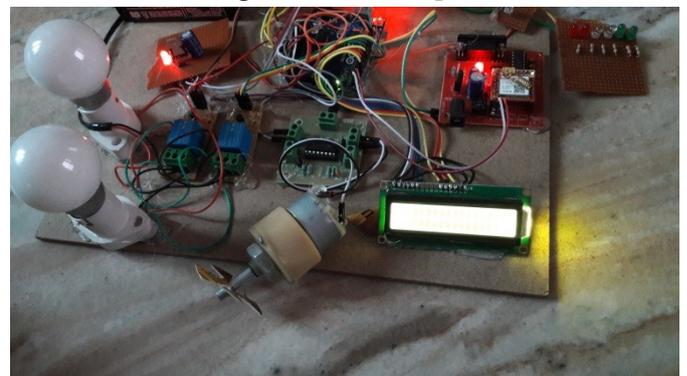


Figure 13. Roatation Motor Through Gsm

#### **IV. CONCLUSION**

In this system, we proposed a home automation based on renewable energy sources that uses a GSM ( Global System for Mobile Communication ) design. This system is also a perpetual system .This proposal will be available at low cost in the market for future generations. To overcome the power cuts and the expensive cost , we implemented here PIR and LDR sensors .The total experiment is purely based on GSM design technology which will be very useful for the upcoming graduates to implement better cases than this. This will enables the country to develop in a electronics usage than in previous

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