GSM BASED HOME AUTOMATION SYSTEM

Shalaka Shinde(11BEC0128),Atish Patil(11BEC0396) slot-A2

Abstract:

In this project report, it explains how a reliable and an authentic wireless communication could be easily developed between a mobile phone and microcontroller using GSM (Global System for Mobile Communication) MODEM (Modulator-Demodulator). This report explains GSM based home automation system which can be widely used for multitude of applications including educational sector, traffic control, banks, public advertisements etc. Moreover we can also learn as well as modify some of the common applications of GSM MODEM as per the requirements and needs of the user. Here we will learn the hardware behind the picture.

Introduction:

GSM – a digital mobile telephony system, which is globally accessed by more than 212 countries and territories. Global system for mobile communication is completely optimized for full duplex voice telephony. Initially developed for the replacement of first generation (1G) technology, now GSM is available with lots of salient features with the constant up gradation of third generation (3G) technology. And now with the alliance of microcontroller, GSM MODEM could be further tailor-made for some of very innovative applications including GSM based DC motor controller, GSM based home security system, GSM based robot control, GSM based voting machine control, GSM based stepper motor controller etc.

Objective:

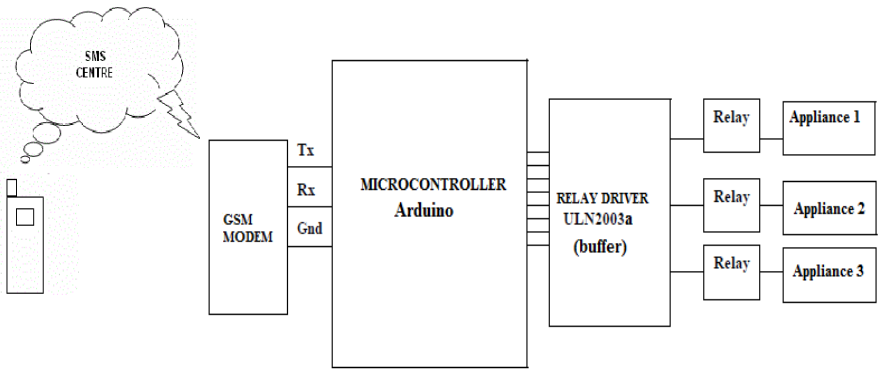
The main objective of this project is to design a control system, that will act as an embedded system which can monitor and control appliances and other devices locally.

The proposed approach for designing this system is to implement a microcontroller-based control module that receives its instructions and command from a cellular phone over the GSM network. The microcontroller then will carry out the issued commands.

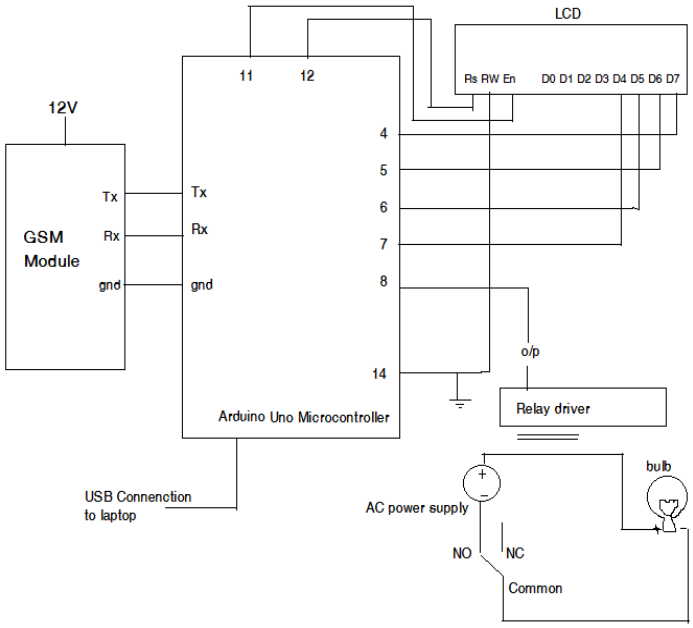
Tasks:

- Sending message from any of the remote area to the home appliances using GSM mobile.
- For sending the text message from remote area we need to interface the mobile phone with GSM Modem.
- For developing some of GSM based applications we need to have some commons peripherals including GSM MODEM, SIM, microcontroller, LCD (Liquid crystal display), power supply and also some connecting wires

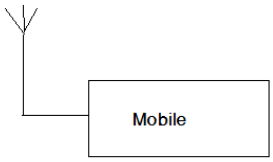
Block Diagram:



Circuit Diagram:



Transmitter:



- The message to switch on or off the device is sent using the mobile phone.
- This message is sent on the no.of SIM card which is inserted in GSM module.

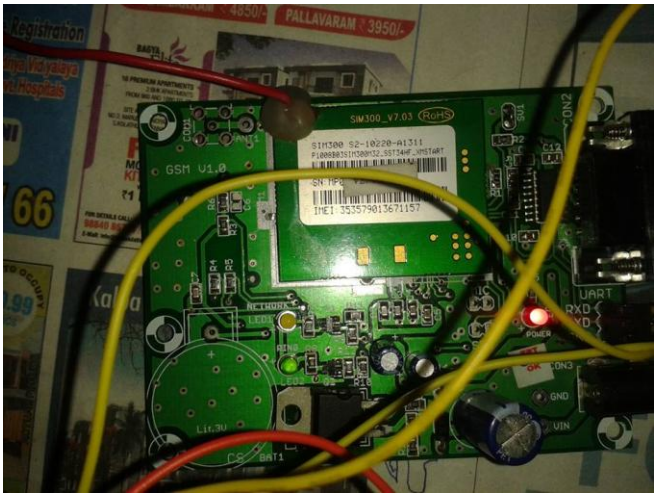
Receiver side:

Arduino Uno Microcontroller:

The Arduino Uno is a microcontroller board based on the ATmega328.It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(),and digitalRead() functions.

GSM Module:



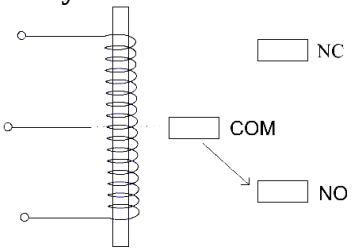
This is GSM sim 300 module used in our project.

It is a wireless MODEM – just like dial-up MODEM, which works with GSM wireless network. But there is a difference between dial-up MODEM and wireless MODEM. Dial-up MODEM send and receives data through a fixed telephone line while wireless MODEM send and receive data through radio waves.

Power supply is given to GSM module through **12V** adapter.

Rx pin of module is connected to Rx pin of Arduino,Tx pin to Tx and grnd pin to grnd pin of microcontroller Arduino Uno.

Relay:



NC: - Normally Connected
NO: - Normally Open
COM: - Common

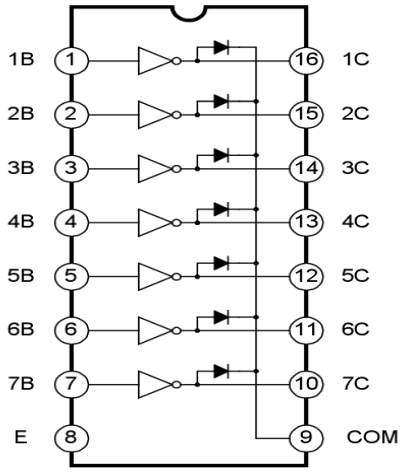
The relay driver is used to isolate both the controlling and the controlled device. The relay is an electromagnetic device, which consists of solenoid, moving contacts (switch) and restoring spring and consumes comparatively large amount of power.
Relay is used to switch the electrical supply to the appliances.

When ON msg is sent to the GSM module,the relay switch shifts to NO connection and bulb goes ON.

When OFF msg is sent to the GSM module,the relay switch shifts to NC connection and bulb goes OFF.

ULN 2003a:

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays.
It consists of seven NPN Darlington pairs that feature high-voltage outputs.



LCD:

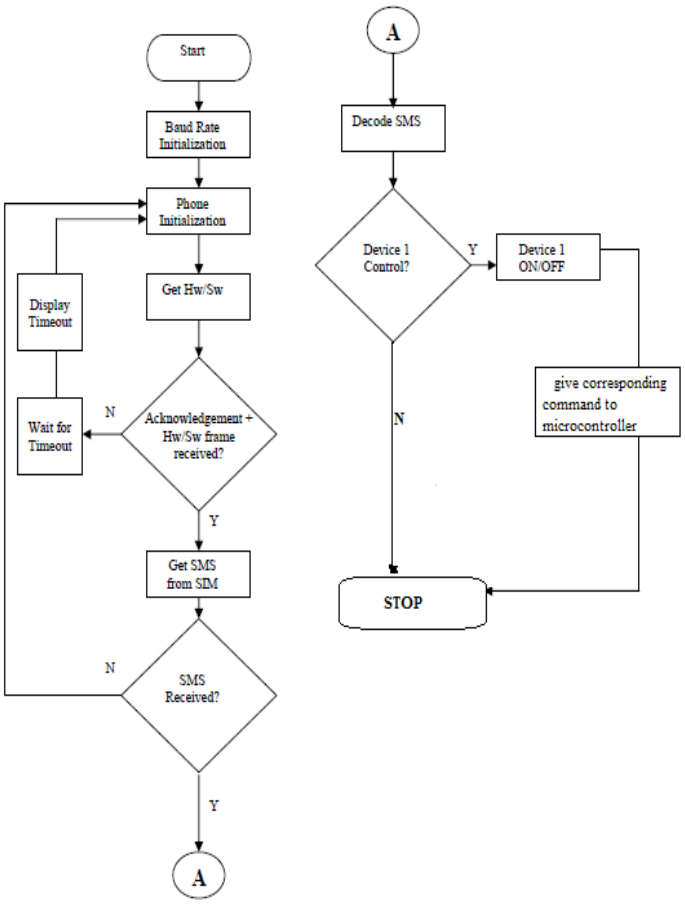
LCD - liquid crystal display, is a electronic device for displaying text or characters. We are using 14 pins LCD and the description is as follows:

D4,D5,D6,D7 pins are connected to pins 7,6,5,4 of microcontroller respectively.

RW is connected to ground same as microcontroller.

RS and En are connected to pin no.12 and 11 of arduino respectively.

Program Flow-chart:



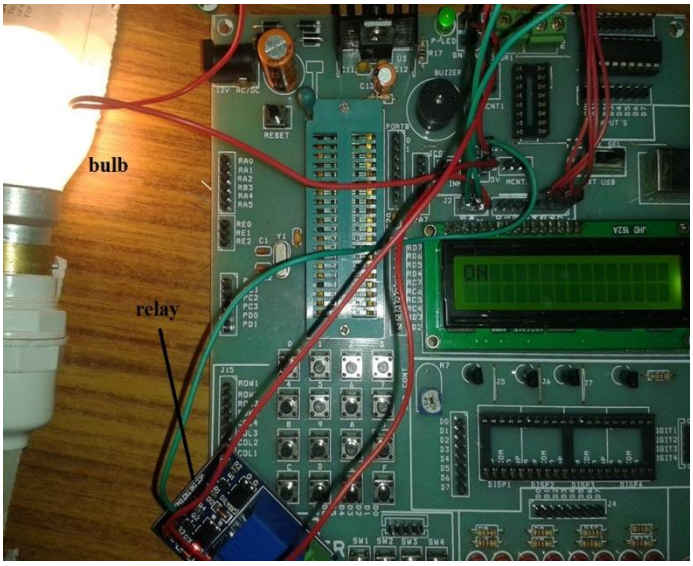
Softwares used:

Arduino IDE software for Arduino 1.0.5.

Discussion:

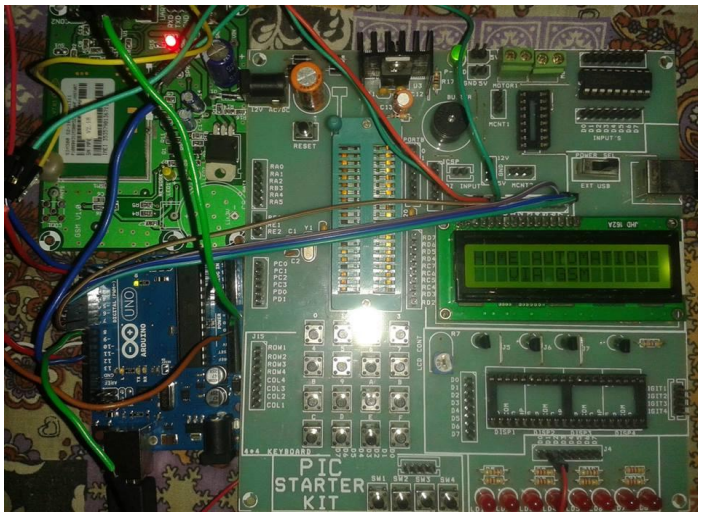
- First of all SIM(Subscriber Identity Module) is inserted in the port provide in GSM module sim 300.
- All connections are ,made as mentioned above.
- Output is taken from pin no 8 of arduino microcontroller and the relay driver and then bulb is connected to it.
- Power supply is given to all boards(Arduino through USB,GSM module through 12V adapter).
- When GSM module is working,the status LED is ON.
- If SIM card is in coverage area,the network status LED available on module blinks.
- When call is made it keeps blinking.

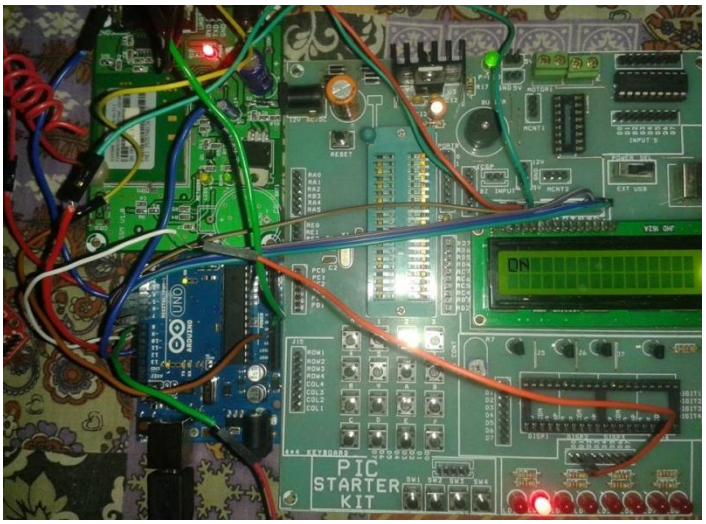
- Message **ON** is sent from another mobile to sim card in module.
- Then this command is serially sent to the microcontroller and further microcontroller gives command and relay will be on NO(Normally Open) condition. in order to switch the bulb ON.
- Message **OFF** is sent,then the microcontroller gives corresponding commands and relay will be on NC(Normally Closed) condition in order to switch the bulb off.
- when circuitry is switched on:
  LCD displays "HOME AUTOMATION VIA GSM"
  complete circuit diagram of project:

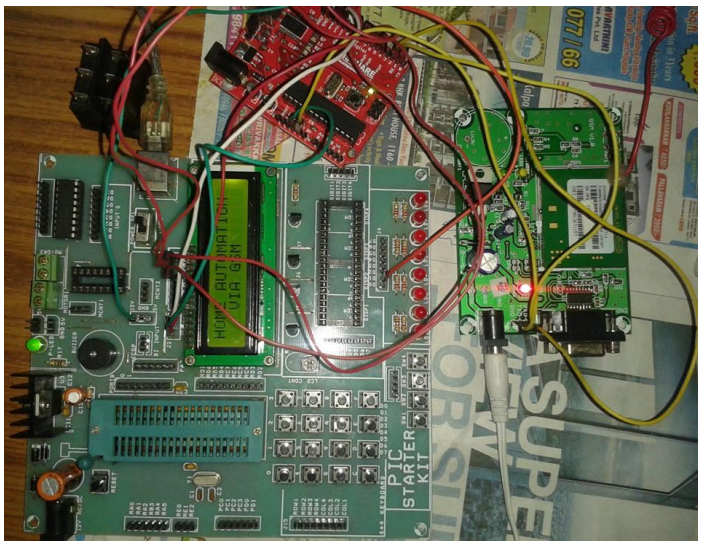


the bulb is ON

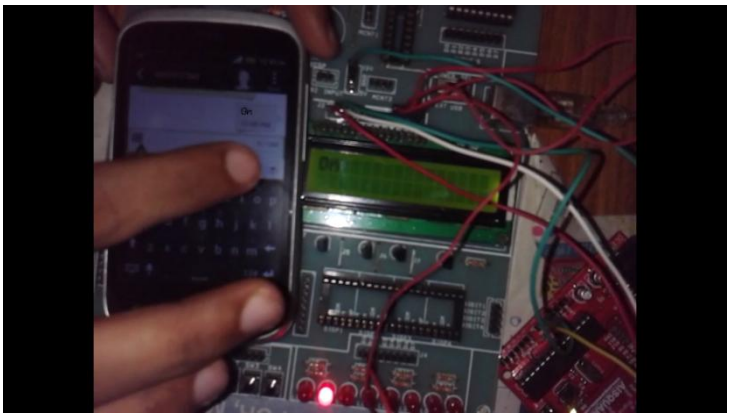
ON is displayed on LCD.







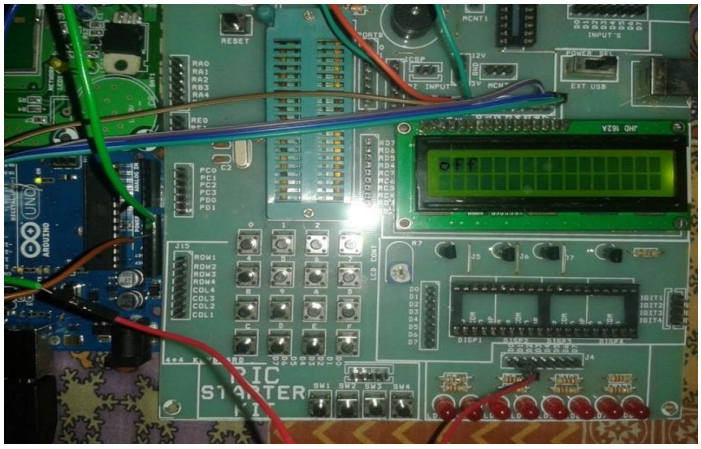
when ON msg is sent

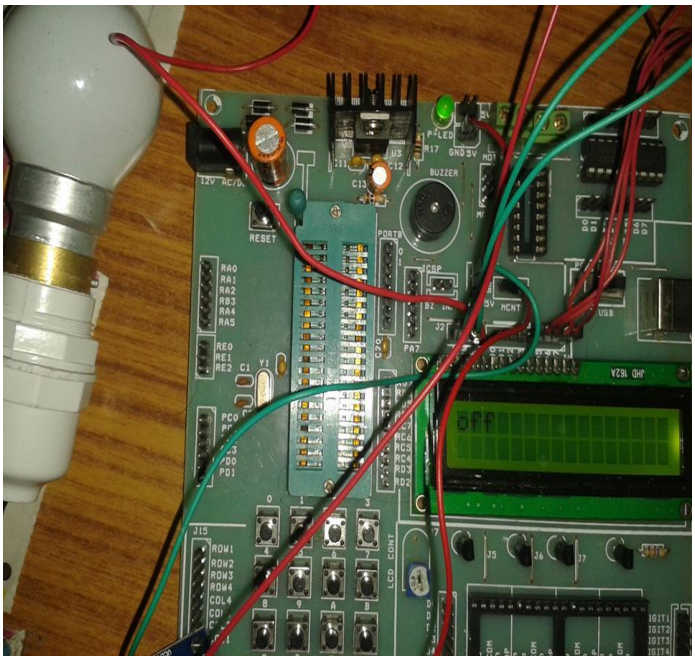


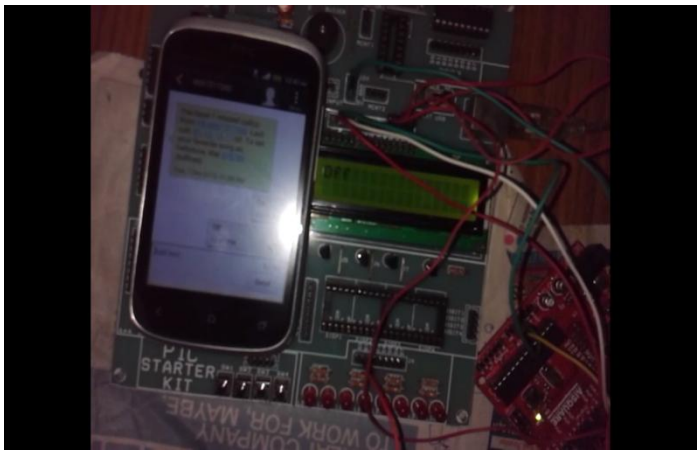
When OFF message is sent:

The bulb is off.

OFF is displayed on LCD.







Conclusions:

- The project we have undertaken has helped us gain a better perspective on various aspects related to our course of study as well as practical knowledge of electronic equipments and communication.
- We became familiar with software analysis, designing, implementation, testing and maintenance concerned with our project.
- The extensive capabilities of this system are what make it so interesting. From the convenience of a simple cell phone, a user is able to control and monitor virtually any electrical devices.
- The end product will have a simplistic design making it easy for users to interact with.

Future work:

The project we have undertaken can be used as a reference or as a base for realizing a scheme to be implemented in other projects of greater level such as weather forecasting,temperature updates, device synchronization, etc.

In future,we are looking forward to develope the password protected Home Automation system,so that only certain user can access home appliances.

Result:

Thus the project for GSM based home automation system is performed successfully and result is verified.

References:

- http://arduino.cc/ website for all Arduino related products
- GSM based e-Notice Board: Wireless Communication," **International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-2, Issue-3, July 2012**
- Remote-Controlled Home Automation Systems with Different Network Technologies," **Centre for Applied Internet Research (CAIR), University of Wales, NEWI, Wrexham, UK**
- Innovation challenges in the home automation market,**white paper,SENTEC**
- Home Automation in the Wild: Challenges and Opportunities,"**Microsoft Research, *University of Washington**
- http://www.youtube.com/watch?v=6zqMEoQo7_Q relay driver circuitry
- http://www.youtube.com/watch?v=GlHJckUDaUo GSM module tutorial