D.J. Sanghvi College of Engineering

B.E. Project Idea

Home Automation

By   Sharad Gupta 60002115028

      Parth Mehta   60002115050

      Sandip Patel 60002115059

Introduction

- It's 21st century & automation plays an integral part of human life.

- Home automation refers to the use of computer and information technology to control home appliances and features (such as windows or lighting).

- It reduces human efforts and at the same time, energy efficient and time saver.

- The main objective of Home Automation and Security is to help handicapped and old-aged people which enables them to control home appliances and alert them in critical situations.
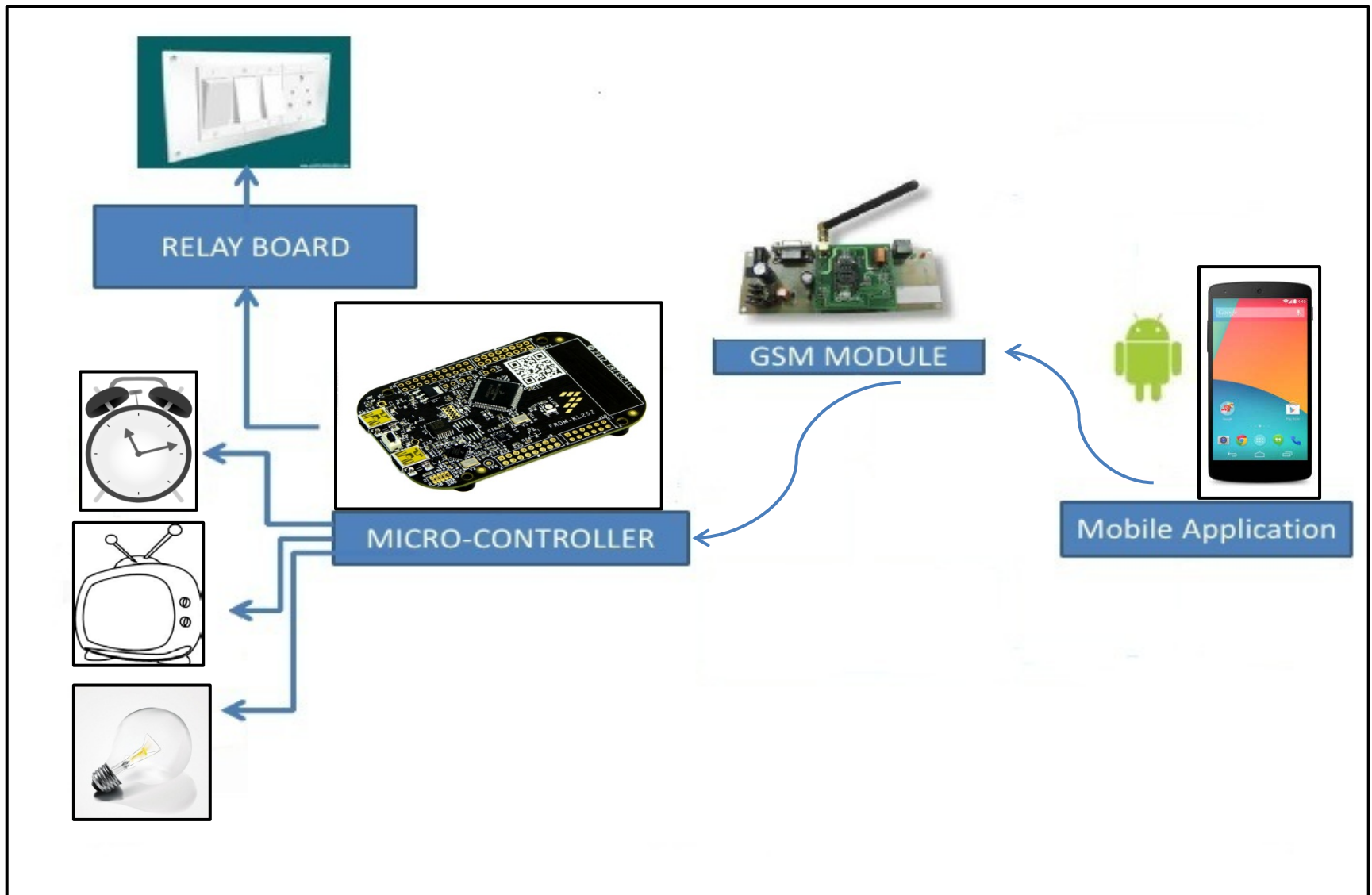
Literature Survey

- Home Automation using Bluetooth via PC.

- Designing a prototype electrical device control system using Web.

- Use of ZigBee network protocol.

- Google and Microsoft recently entered the home automation domain. At 2011 I/O conference, Google announced Android@Home.

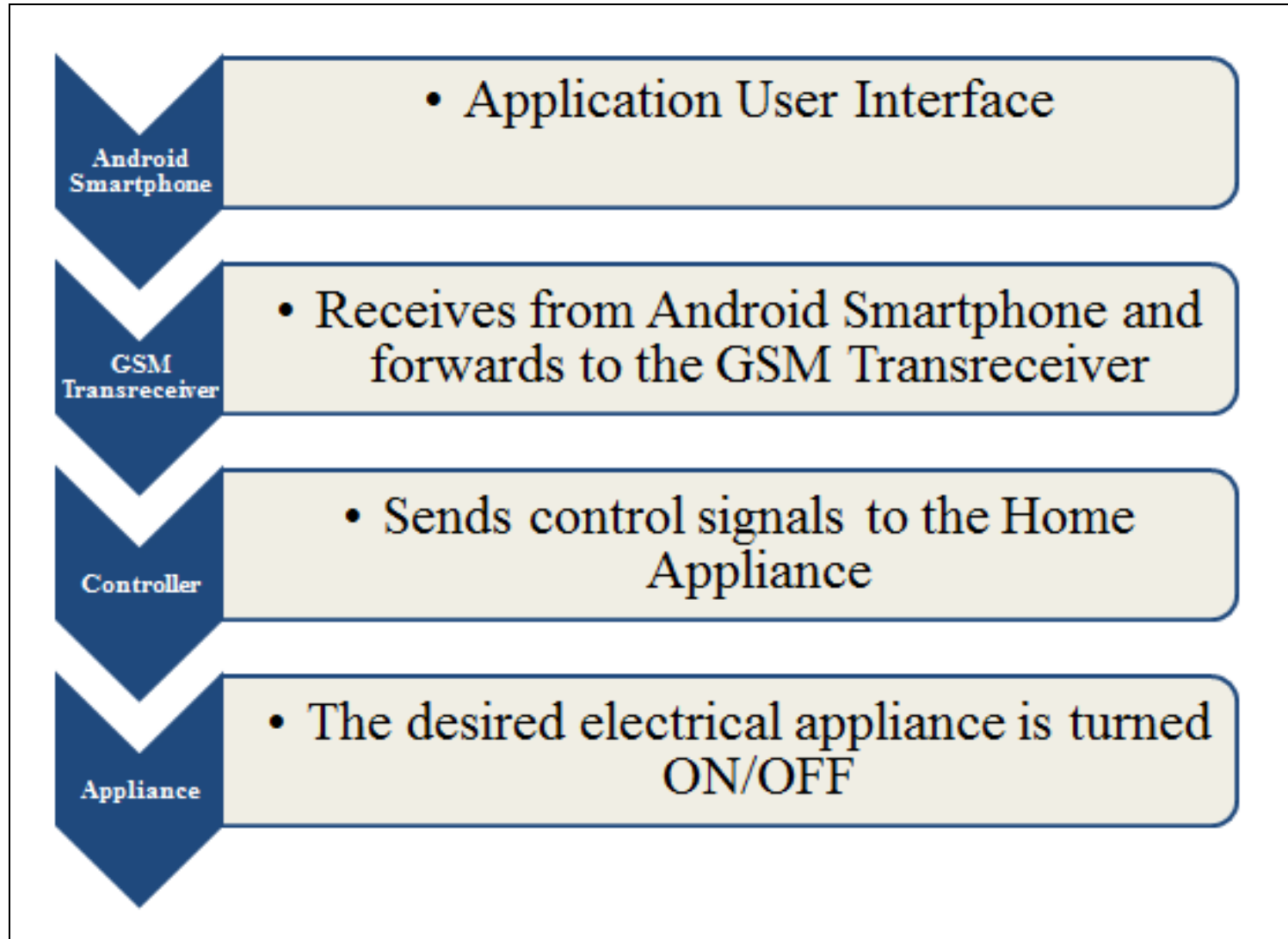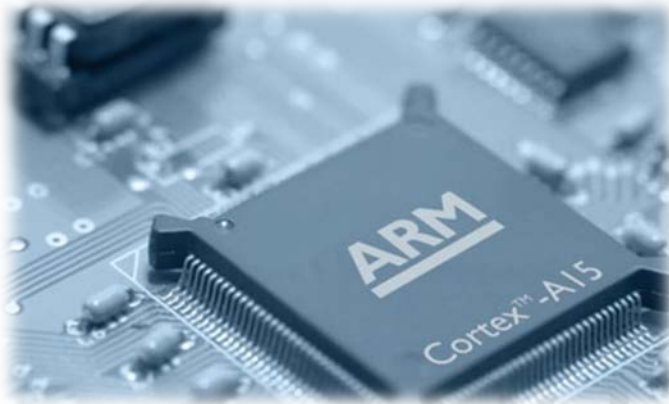- Microsoft is similarly working on a project called HomeOS.

Block Diagram

RELAY BOARD

MICRO-CONTROLLER

GSM MODULE

Mobile Application

Schematic

Android Smartphone	• Application User Interface
GSM Transreceiver	• Receives from Android Smartphone and forwards to the GSM Transreceiver
Controller	• Sends control signals to the Home Appliance
Appliance	• The desired electrical appliance is turned ON/OFF

Hardware

Components:

- Microcontroller

- GSM Module

- Electrical Appliances

Microcontroller

- **ARM Cortex M0 Series / ATMega 32 Series** with C Language Interface.
- **Controls** the end-user electrical appliances.

GSM Module

- **GSM SIM300** with RS232 Serial UART Communication.
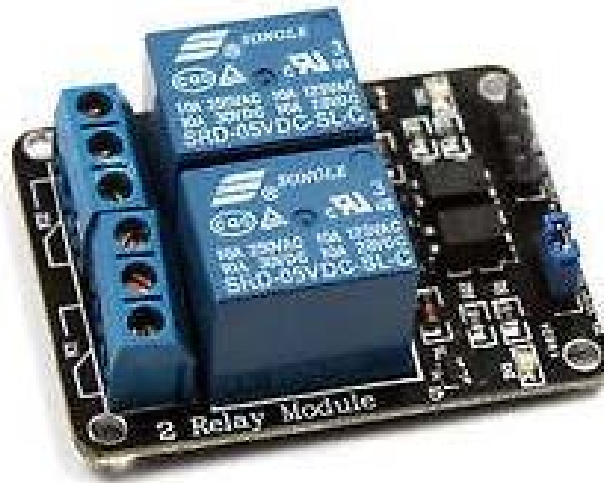- Acts as a **transreceiver** between the Android apk and Appliances.

Communication Media

- **Medium : GSM SIM 300**
- Mode : Wireless Communication
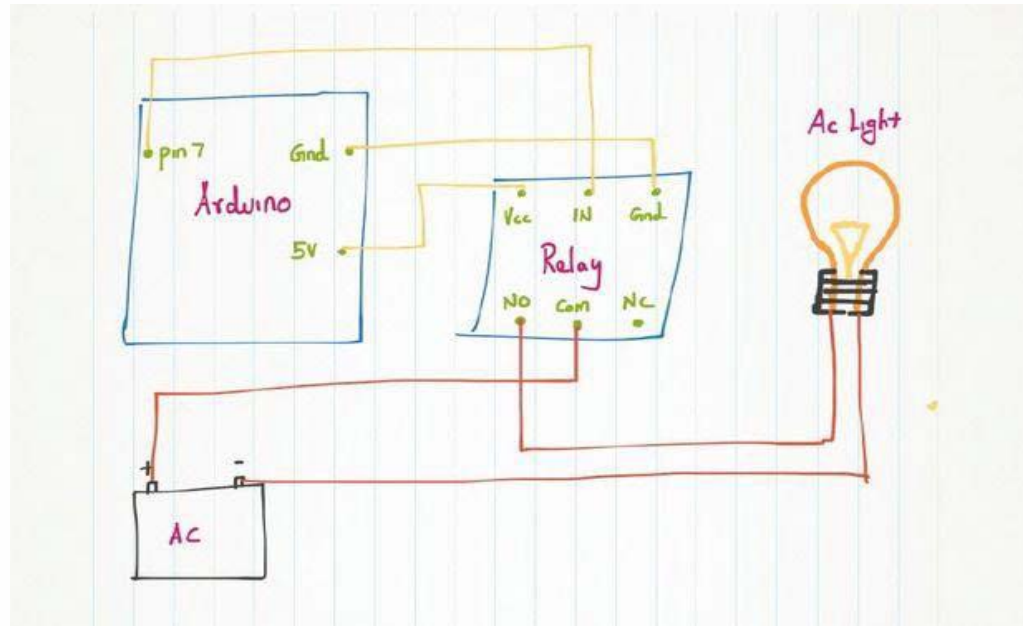- AT Commands (SMS Mode): AT, AT+CMGR, AT+CMGF & AT+CMGS.

Relay Module

- Active Low Input 3 Terminals 2 Channel 5V Relay Module
- It allows a wide range of microcontrollers such as Arduino, AVR, PIC, and ARM with digital outputs to control larger loads and devices like AC or DC Motors, electromagnets etc.
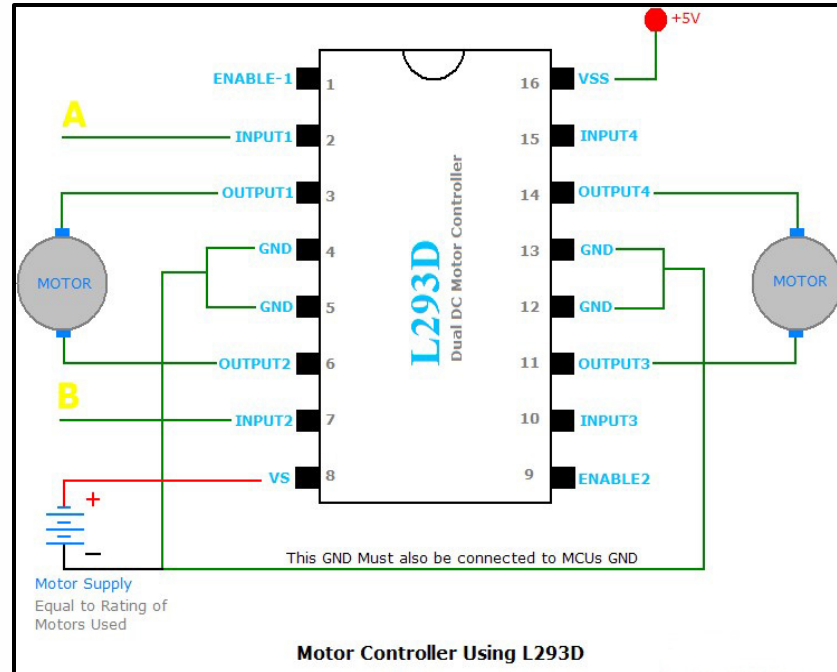
Relay Module - Working

- Relay works on the principle of electromagnetic switching.
- Electric Bulb connected to the electromagnetically powered switch of the Relay is turned ON/OFF depending upon the relevant message from the Android Application.

🤖 Motor Driver IC L293D

ENABLE-1   1   16   VSS   +5V
A   INPUT1   2   15   INPUT4
OUTPUT1   3   14   OUTPUT4
GND   4   13   GND
GND   5   12   GND
OUTPUT2   6   11   OUTPUT3
B   INPUT2   7   10   INPUT3
VS   8   9   ENABLE2

L293D Dual DC Motor Controller

MOTOR   MOTOR

This GND Must also be connected to MCUs GND

Motor Supply
Equal to Rating of
Motors Used

Motor Controller Using L293D

- Motor Driving is triggered using dual H-Bridge mechanism IC L293D since MCU ports aren't capable of driving 9V DC Motors.
- Controls 2 DC Motors in both directions depending upon polarity.

Application Components

- **Components:**

- Toggle Button
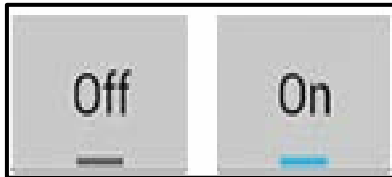
- Text View

- Edit Text
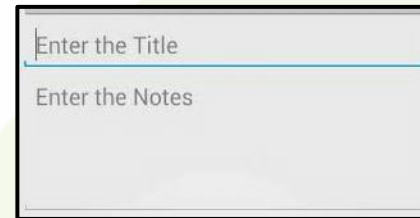
- List Activity (List View)

Shared Preferences

- Saves Key-Value Sets

- Saves Files

- Saves Data in SQLite Database

- Here state values of appliances are saved in key-value pairs in an XML file.

- We use Shared Preferences class and Preference Manager Class of Android.

Shared Preferences Working

- PreferenceManager class helps to create object of class SharedPreferences

- Methods used to write in SharedPreferences
- putInt(key_int,value_int)
- putString(key_string,value_string)

- Methods used to read from SharedPreferences
- getInt(key_int,DEFAULT)
- getString(key_string,DEFAULT)
- DEFAULT is a string that will be shown when the user has not given input OR has just installed app.

Generation of Message

- Lower case characters from a to j are sent, each representing ON or OFF state of an appliance.

- SmsManager class instance is used to invoke sendTextMessage(number,message)

- User can change anytime the GSM Mobile number from going to Options > Save Number.

- A custom layout has been created for convenience.

- User should always send message in order to send any changes.

Working (Revisiting)

Android apk sends the user's request

⬇

Does Appliance needs to be turned ON/OFF ?

⬇

Communicate it with GSM Transreceiver

⬇

Activate the Controller and execute the control signals

⬇

Turn ON/OFF the desired Electrical Appliance
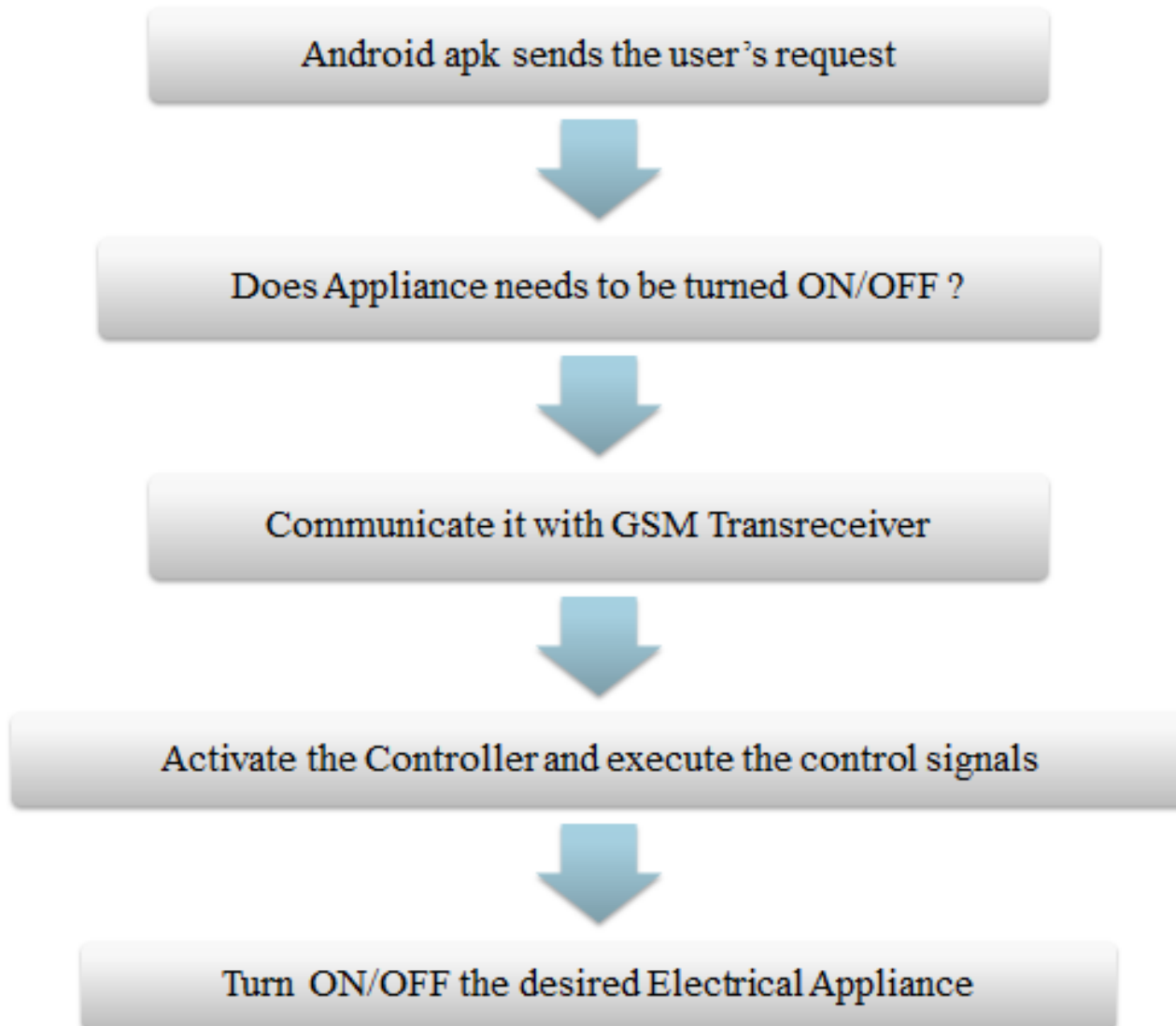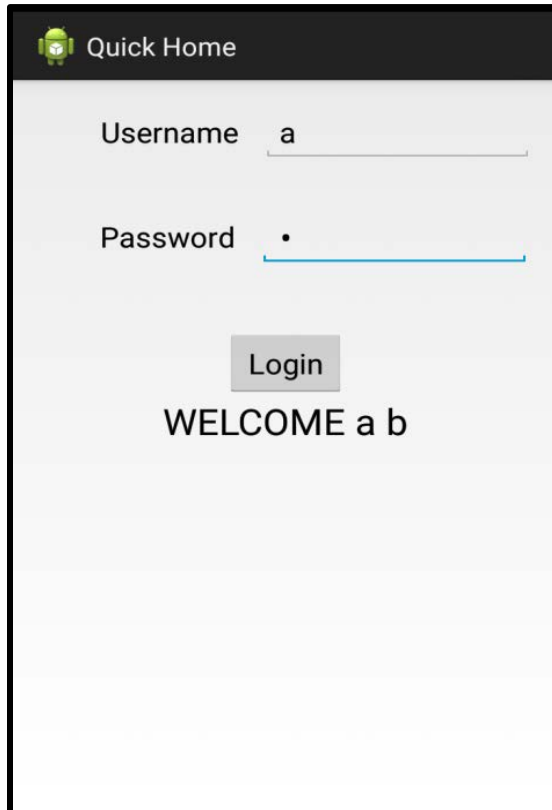
Application Screenshots

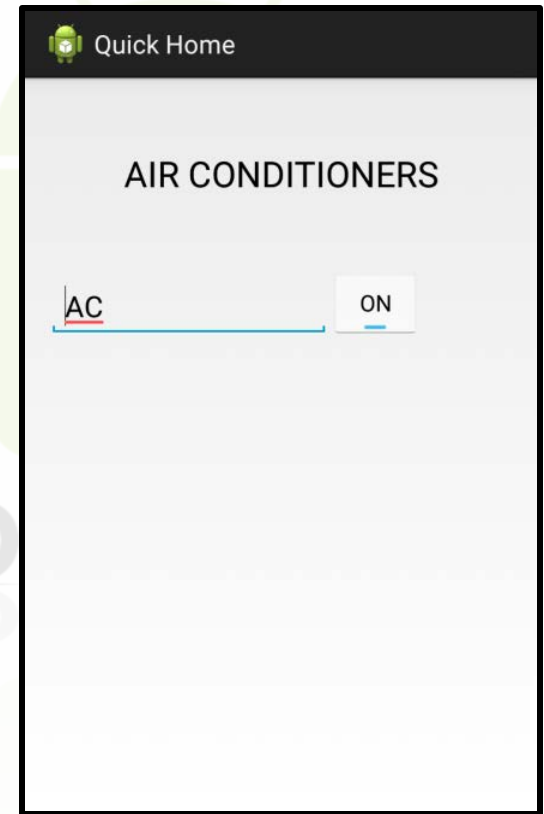- Authentication Screen
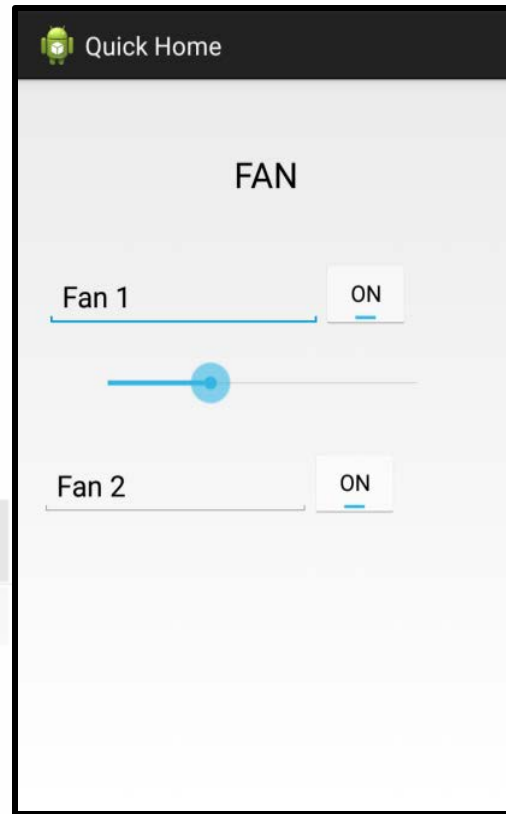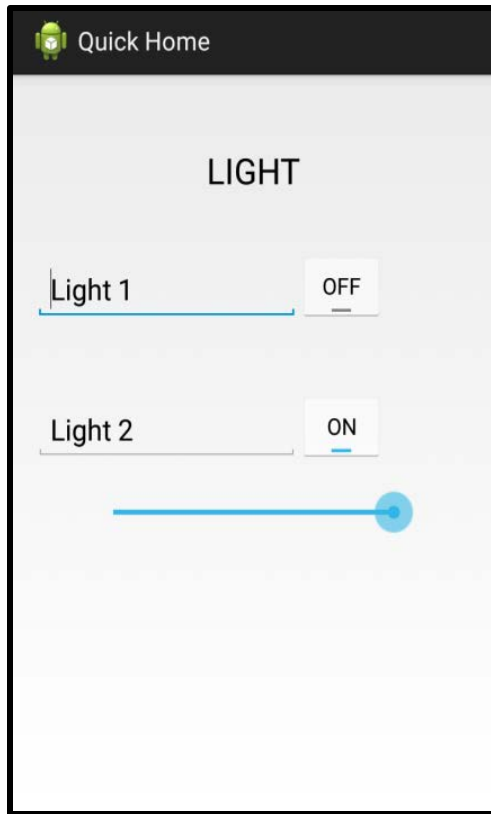
Application Screenshots

- List View of Appliances

- GSM Mobile Insertion
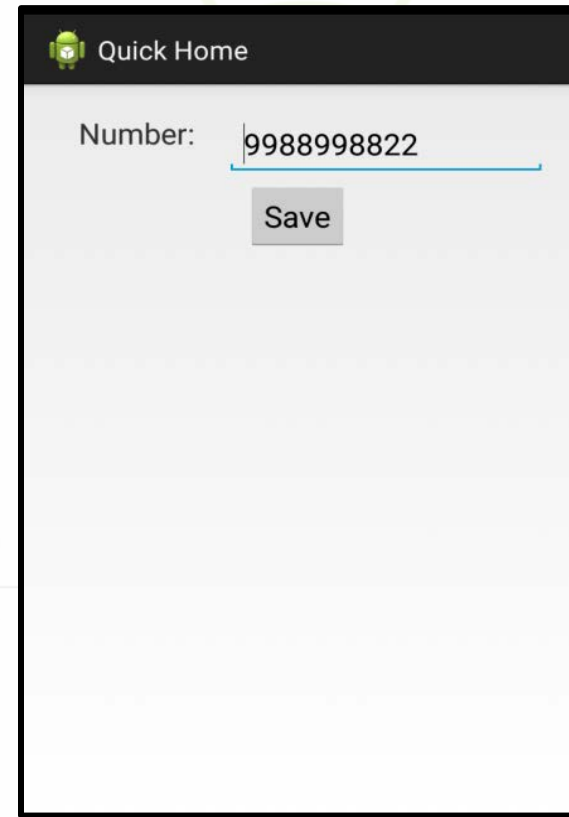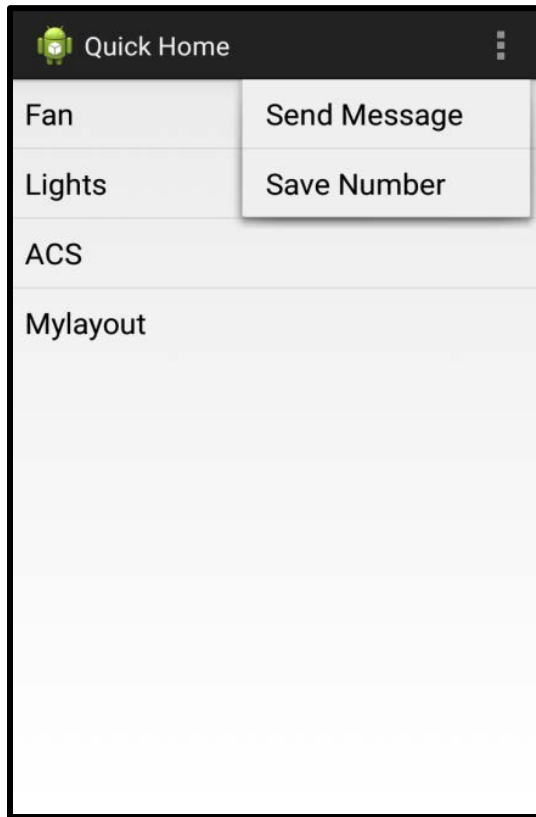
Application Screenshots

- Appliances Activity Screen

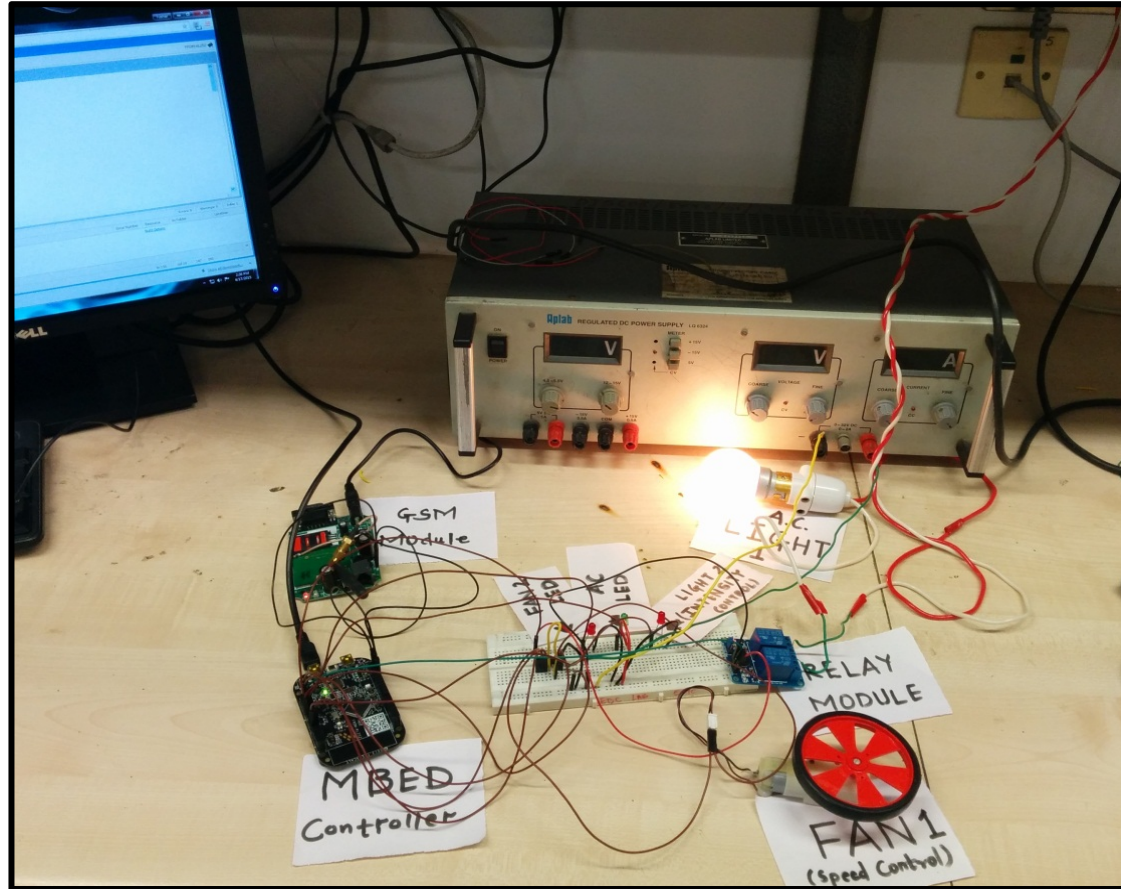# Application Screenshots

- Custom Layout

- This screen offers a quick view and control of all appliances on a specimen layout.
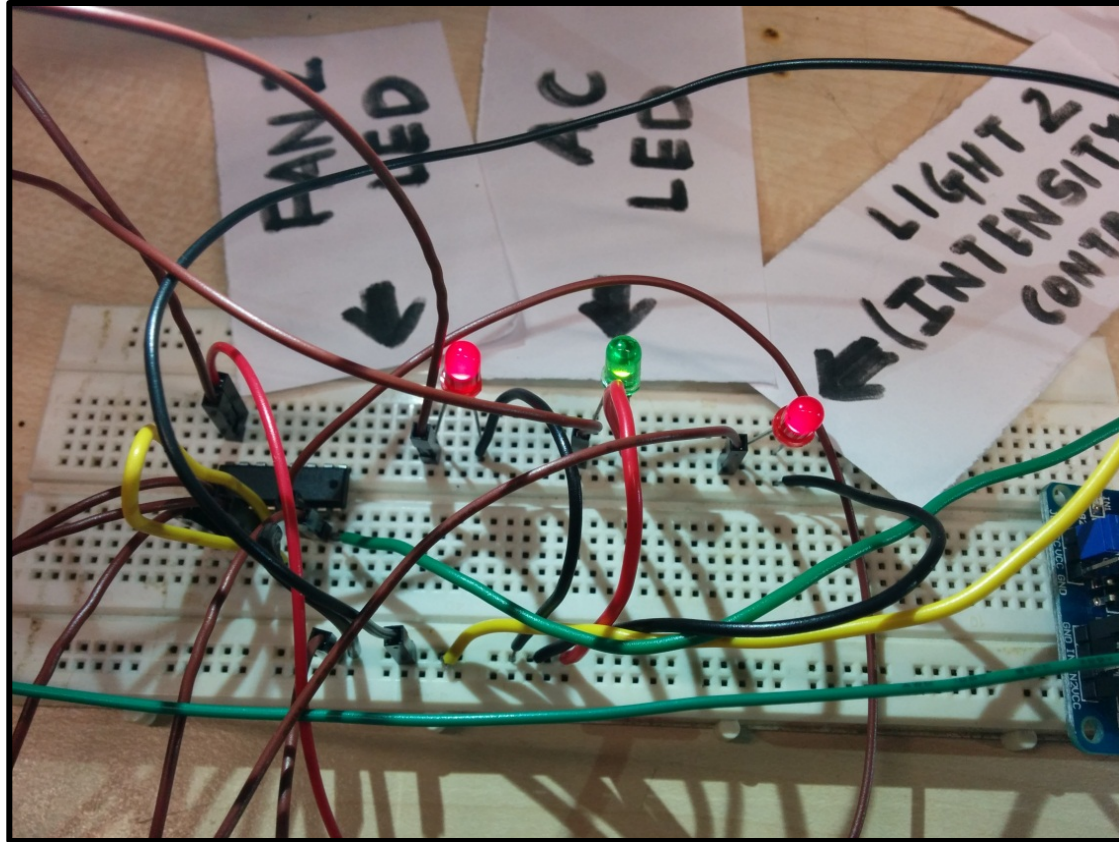
Project Screenshots

- Complete Hardware Setup with external Power Supply

Project Screenshots

- IC L293D and status LED's setup on breadboard.

Results

- When software works in synchronisation with Hardware, results are inevitably expected.

- This project was successfully implemented, debugged and tested.

- The result of all this work paved way for reliable output from all the hardware devices working in sync with the software application.

- The same was clearly monitored with the help of a third party terminal application such as Hyper Terminal or Tera Term on a personal computer.

Scalability

- Anti-theft Reporting
- Emergency Reporting
- Arm / Disarm by SMS
- Ability to be controlled from a central host PC through voice.

Conclusion

- Flexibility & Convenience, Security, Cost Saving & Remote Control Usability is thus achieved by the end-user using Home Automation concept.

THANK YOU